Western Industry

February
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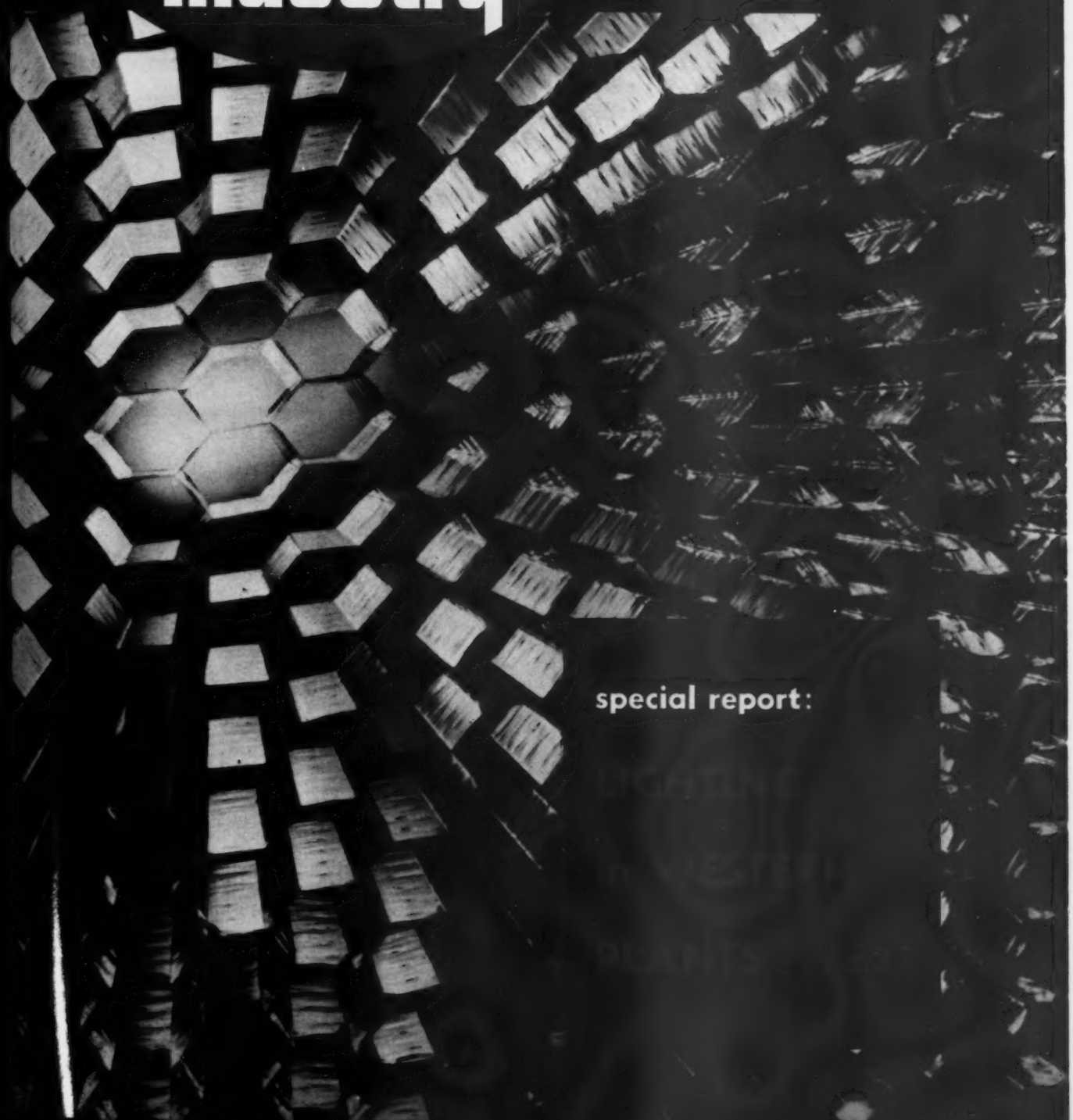
Vol XXIV No 2



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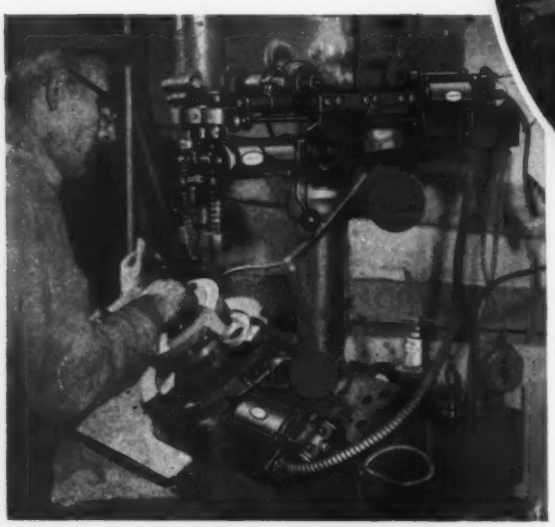

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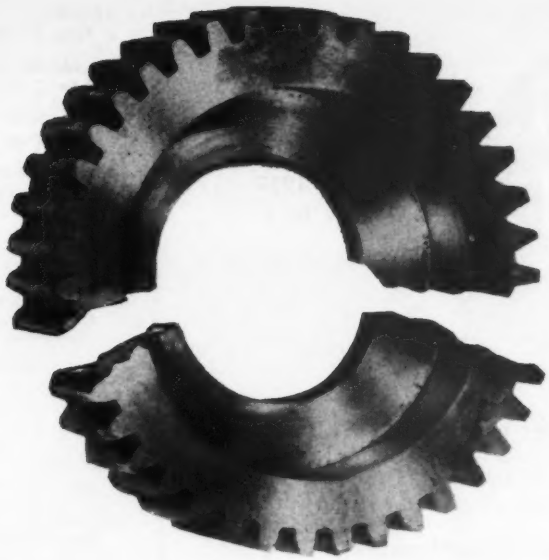
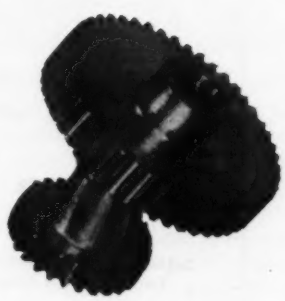


How to avoid alloy steel failures



Ordinary precautions may protect you most of the time. But your luck could run out—and a single alloy steel failure can result in serious loss.

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Western Industry

KING PUBLICATIONS

February, 1959

Vol. XXIV, No. 2

What makes a technical society chapter tick . . . or not? . . . 8
To find out why some chapters of a technical society flopped while others flourished, WESTERN INDUSTRY editors flew to the Northwest to get some revealing answers. Some may shake you.

Reciprocating gravity conveyors break all bottlenecks 29
A new—patent-pending—conveyor system assures a smooth flow of materials no matter what bottlenecks might occur. And it links all parts of a sprawling Western plant into one handy unit.

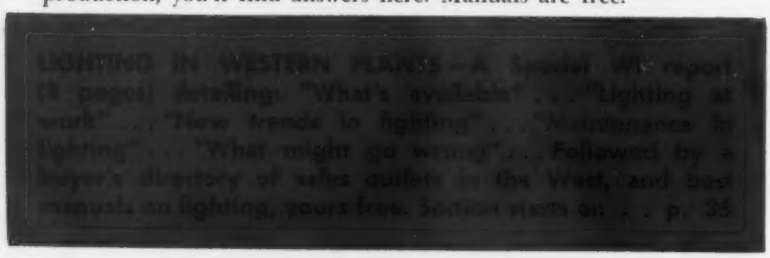
How many industrial engineers pay off in a small plant . . . 31
If your production is small it may be because your industrial engineering staff isn't large enough. Here's how industrial engineers—armed with bar charts—pay off in a small plant.

New power for gearmotors and motorized pulleys 33
For a power application under Western conditions—abrasive dust—special features were introduced in gearmotors and motorized pulleys. They may be what you're looking for.

Cost Reduction Idea-Book; Part II 50
Here are more ways to save time and money under Western plant operating conditions. Applications include those in material handling . . . production equipment . . . maintenance . . . power . . . etc.

Preview of Western Space Age Conference 66
Here's your roundup of speakers, exhibitors and activities at this important Western Conference. Over 100,000 persons are expected to view the over 500 exhibits and displays.

Today's best manuals on industrial chemicals 68
Industrial chemicals are becoming more a part of the Western scene. Whether you need chemicals for metal finishing or gases for production, you'll find answers here. Manuals are free.



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STANDARD ENGINEER'S FIELD REPORT

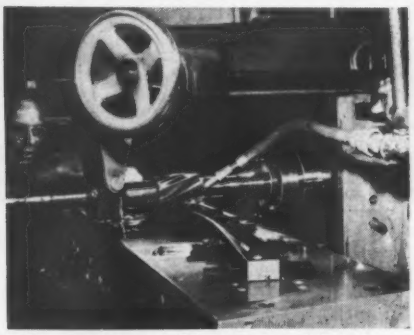
PRODUCT **Chevron Cutting Oil TNC**

FIRM **Experimental Specialties Co. El Segundo, Calif.**

Mills titanium to .0025″ tolerances

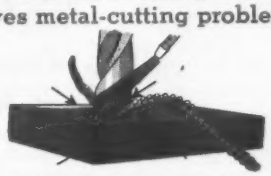
Chevron Cutting Oil TNC protects carbide tool (above) as it cuts slat-track contour from titanium vanadium alloy with Rockwell hardness of 68! This Sunstran rise and fall tracer-control milling machine makes missile and aircraft parts at Experimental Specialties Co. Chevron Oil's extreme pressure additives help machine maintain tolerances of plus or minus .0025", holding rejects to minimum. Reports firm's president, Harry McKillip: "Chevron Cutting Oil TNC is the most economical and efficient general purpose cutting oil I've found in 30 years in this business. Only TNC does the job for us on aluminum, brass, Dural, HYTUF and titanium."

End milling on titanium piece is done by Cincinnati rise and fall cam-control machine which cuts slot-like track. Jobs run from 50 to 1000 duplicate parts. Titanium alloy in use has sufficient hardness to destroy file teeth.



Fritz-Werner Horizontal Milling Machine mills flat parallel surfaces of slat-track. Firm reports all-purpose Chevron Cutting Oil TNC, used in 40 pieces of shop equipment, eliminates need to change oil when working different materials.

Why Chevron Cutting Oil TNC solves metal-cutting problems



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AERIAL VIEW OF NEW Campbell Chain Company plant at Alvarado, California. This modern factory will manufacture a complete line of welded and weldless chain for West Coast users.

Complete Chain Making Facilities Now, for the First Time on West Coast

Campbell Chain Company opens modern new plant at Alvarado, California, to serve 11-state area

IMPORTANT NEWS to users of chain is the Campbell Chain Company's new factory and offices to be opening soon at Alvarado, California.

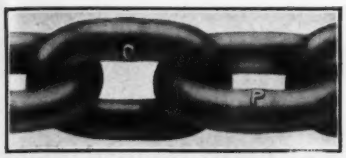
The new plant will speed delivery of chain to Western industrial, commercial and automotive markets, making possible same-day or overnight shipment of Campbell Chain's complete line of products. The plant will also supply Campbell warehouses in Portland, Seattle, and Los Angeles.

The new Alvarado factory will be the most modern plant of its kind in the country. The efficiently designed, one-story building covers over 130,000 square feet of office and manufacturing facilities. It provides all the advantages of completely integrated, straight-line production.

Equipment includes the latest in heat-treating and annealing furnaces and the most modern wire-drawing, forming and welding machinery. The factory has complete facilities for metallurgical and product testing.

The Alvarado plant marks a major development in the expansion of Campbell Chain Company, adding to manufacturing facilities at York, Pa., and West Burlington, Iowa, and warehouses across the nation.

New Campbell Plant to Produce Hundreds of Types of Welded and Weldless Chain and Assemblies



PROOF COIL, BBB COIL, HIGH TEST STEEL CHAIN AND CAM-ALLOY: These grades represent the strongest electric welded chains manufactured by Campbell. Proof and BBB are made from open-hearth basic steel, High Test from high-carbon steel and Cam-Alloy from special analysis Alloy Steel. Each grade is designed for specific uses. Eleven or more sizes of each grade are available.

STRAIGHT LINK MACHINE CHAIN: This is a general utility chain, manufactured from low carbon steel. Characterized by short narrow links. Supplied in many finishes and in twelve sizes.

TWIST LINK MACHINE CHAIN: Same original link as Straight Link Machine Chain; however, each link is given a 90° twist. Chain will lie flat. Twelve sizes available in variety of finishes.

STRAIGHT LINK COIL CHAIN: A long straight link of low carbon steel. Used for general utility purposes and supplied in all standard finishes and in twelve sizes.

TWIST LINK COIL CHAIN: Same original link as straight link coil chain, then given 90° twist. Will lie flat. Supplied in many finishes and in twelve sizes.

PASSING LINK CHAIN: A general purpose chain made of low carbon steel. Links can pass one another freely, eliminating kinking. Available in all standard finishes and in three sizes.

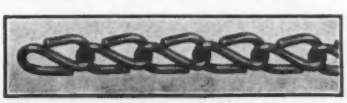
WELDED CHAIN ASSEMBLIES: All grades of welded chain are available with a variety of attachments for specific uses, such as Log Chains, Boomer Chains, Anchor Chains, Winch Line Chains and Binding Chains.

SLING CHAINS are available in many grades and styles with a full assortment of attachments. Guaranteed for a full year.

INCO COIL CHAIN: The most popular formed wire chain used on the farm, in the playground, in the boat and has many other general applications. Made of mild steel in three finishes and in fifteen sizes.

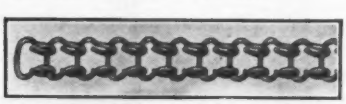
LOCK LINK PATTERN COIL CHAIN: The sprocket wheel or overhead door chain that has many other general utility uses. Made of mild steel. Eleven sizes, three finishes.

SINGLE JACK CHAIN: Available in mild steel or brass. Used for fixture suspension and where high strength is not necessary. Available in eight finishes, twelve sizes.



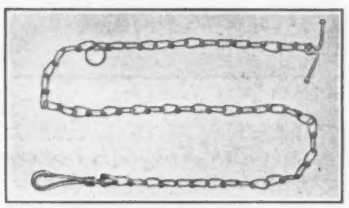
DOUBLE JACK CHAIN: For children's toys or ornamental purposes. Good for light utility applications. Steel or brass, nine sizes, six finishes.

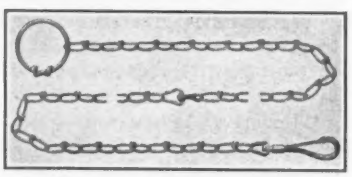
SAFETY PLUMBERS CHAIN: A flat stamped link in brass or steel, used for plumbing fixtures or applications requiring light, flat chain. Six finishes, four sizes.



LADDER SPROCKET CHAIN: The Sprocket wheel drive chain for small light mechanisms. Can be made of brass or various types of steel. Usual finish, bright. Five sizes.

SASH CHAIN: Flat stamped link that operates smoothly over pulleys. Made of bronze or mild steel. Eight finishes, nine sizes.





WELDLESS CHAIN ASSEMBLIES: All weldless chain grades are available in a variety of factory made assemblies. Tie-Out Chains, Kennel Chains, Halter and Dog Chains, Cow Ties, Dog Runner Chains, Hammock Chains are popular examples. All necessary accessories such as "S" Hooks, swivel snaps, rings and swivels are also available.

TIRE CHAINS AND ACCESSORIES

PASSENGER CAR, TRUCK AND BUS TIRE CHAIN: Campbell manufactures tire chains for every vehicle from garden tractors to earth moving equipment. Most sizes are available in three types: Lug Reinforced for maximum traction and long wear, Highway Service for general use, and Mud Service for off-the-road use. Campbell also manufactures New Jiffy tire chains for passenger cars . . . the chains that go on the wheel in less than a minute! Tow Chains, Adjusters, Engine Slings, Emergency Chains and Repair Links are also available from Campbell in Alvarado.

CAMPBELL CHAIN COMPANY York, Pa.—W. Burlington, Iowa—Alvarado, Calif.
E. Cambridge, Mass. — Atlanta, Ga. — Dallas, Texas — Chicago, Ill.
Seattle, Wash. — Portland, Ore.—San Francisco and Los Angeles, Calif.

. . . for more details, circle No. 4 on Reader Service Postcard

Why do some technical chapters FLOP while others FLOURISH?

In Seattle, one chapter of AMHS flopped while a chapter of SPHE flourished. The reasons are many. Here's what we found out . . .

THIS ISN'T AN EXPOSE — it's an honest attempt to give you a realistic look at what makes a professional society tick, and to consider what makes some of them stop ticking.

WESTERN INDUSTRY editors flew to Seattle to interview **Dick Briggs,** Air-Mac Inc., to get his version of why the Seattle chapter of the American Materials Handling Society (AMHS) died.

Then they talked with **Chas. Long,** United Control Corp., Seattle, to ask him why his chapter of the Society of Packaging and Handling Engineers (SPHE), which grew away from the Seattle chapter of AMHS, is successful.

And to tie the research together, they flew further north to Vancouver, B. C., to ask **Ben Hunt,** Consolidated Industries Ltd., and AMHS Regional Vice-President of Region 9 (which covers Seattle as well as Oregon, British Columbia and Alberta), what he did to stop the passing of the Seattle AMHS chapter.

Here's what we learned . . .

From **Dick Briggs** in a busy office off the main showroom: He recalled organizing the first Seattle AMHS chapter in 1954.

"Dick Evans, Jim Miller and I saw the work other chapters were doing, and started talking around, explaining the service of a professional Material Handling Society, and discussing its constitution. The response was wonderful. We had 35 people at our first meeting, held on a lunch hour at the Chamber of Commerce Building in Seattle. Everybody was enthusiastic. There was no problem with our first election, either. Jim Miller was elected president, and although Dick Evans left for San Francisco with his firm soon afterwards, everything ran smoothly for nearly 4 years."

Dick paused. There was a hesitancy when he spoke again.

"Then half the members decided AMHS didn't cover packaging," he said, "and they broke away to form a chapter of SPHE. That weakened our chapter and it got to the stage where members had to be phoned individually—they wouldn't even return meeting cards—and I got fed up. A guy can only work so many hours a day, and there wasn't time to phone everybody. So attendance began to drop off."

Sound from the busy showroom filtered into the office.

"It was no use," Dick said, "what was needed was some guy who could give the time. And another thing, **there was an inbalance of users to vendors.** A professional society isn't for peddling equipment, there's too much of that. Most successful chapters have a balance of at least 60% users to 40% vendors.

"We went about it in the wrong way to start. We looked at customer lists, purchasing agents, etc., and got them interested, but we should have hit top management, then members would have been told YOU BE THERE. That's the only way.

"We had companies pay dues for members who never turned up, or if they did it was at election time and then they voted for some guy they liked instead of somebody whose job would allow the time needed for administering all the complexities which arise.

"A merger between SPHE and AMHS might solve the problem for the Seattle chapter of AMHS, but even then it will need someone who has real time to spark the society into life."

Dick Briggs stopped there.

At the other side of Seattle, at United Control Corp., Chas. Long, president of the local chapter of SPHE, took up the story . . .

"We broke away because we were vitally interested in increasing each member's knowledge in the fields of packaging and materials handling. We're interested in diversification, and our program committee tries to see that we have speakers who fill out the areas about which most packaging engineers know very little.

"Meetings can be ruined by excessive business. In our chapter, the Board of Directors handles busi-

DICK BRIGGS: *". . . there was an inbalance of users to vendors. Most successful chapters have a balance of at least 60% users to 40% vendors. . . "*

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CHAS. LONG: "... Meetings can be ruined by excessive business. Our board of directors handles business and informs members by news release ..."

ness and informs members by news releases so that meetings can concentrate on the feature of the program.

"Fortunately," he went on, "we have a fine ratio of users to vendors. The users are, and should be, primarily concerned with knowledge potential in the organization. They aren't there to be static markets for ambitious salesmen. Each man wants his management to know of the society and his participation. It's a simple matter of individual advancement. Pure economics.

"But," he continued, "each member must be sure that he obtains the optimum from the available sources of the group—and that doesn't include being the sitting object of an eager salesman's approaches.

"Our name describes us as a society of engineers," Chas. Long said. "By definition an engineer translates theory to practical application. If we expect to achieve recognition as engineers we must direct our educational programs along carefully planned lines and not just be satisfied with a review of methods and materials.

"You've got to keep a tight hold on programming. Then you'll get active member participation."

Chas. Long stopped. He felt he'd said enough. SPHE is a successful chapter in Seattle, and when you're successful it's hard to know the bitter lesson learned from failure.

But Ben Hunt has learned from both experiences.

As AMHS regional vice-president administering Region 9 covering Seattle, Oregon, British Columbia and Alberta, he had a definite story to tell:

"The split between AMHS and SPHE in Seattle should never have happened," he said quietly, sitting in an office off the main warehouse of Candian Industries Ltd. "Both groups are bound to be weaker now they are separate.

"I tried everything in my power to prevent the split," he went on. "I wrote letters, invited SPHE to join AMHS in a plant tour, even flew down to Seattle to try and patch things up between officers of each chapter, but it was no use.

"Maybe the merger will solve our problems," he mused. "As things stand, we're just duplicating work in both societies. But there was a definite reason for the failure of the Seattle chapter of AMHS," he said. "It was based in the fact that there was no work-horse who was either able or willing to devote the necessary time to the organization. And the structure of the chapter was wrong in the first place," he added. "There should be at least two users to one vendor or the society gives the impression of being a sales contact group.

"You know," Ben went on, "there's already a movement underway in all professional organizations toward regional administration. Gradually, regional organizations are taking over from national conventions, because by this method there's time for more detailed discussion.

"I'm not saying national conventions will die out altogether," he added, "but I am saying that they will be better off if fewer people attend. Take the last National," he said, "there were 77 representatives at Cleveland, and by the time we'd got through recognizing everybody, there wasn't any time left for a detailed discussion of business on hand.

"Let's hope the 10th Anniversary National Convention, scheduled for Cleveland June 6 and 7, 1959, and followed by the Materials Handling show on June 9, 10, 11 and 12, will be a little less top heavy.

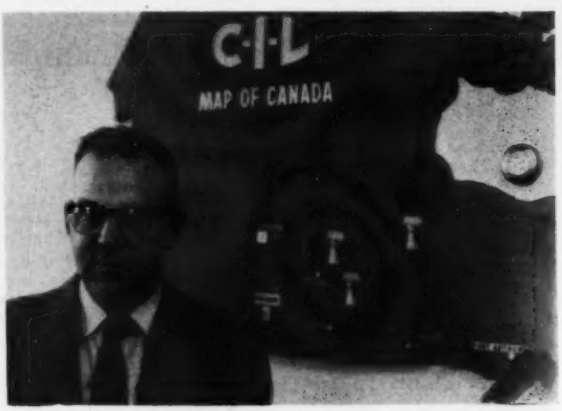
Ben Hunt paused before answering the question as to the prime duties of a regional vice-president: "It's mainly a question of maintaining liaison between local chapters and the national," he said, at length. "But to be effective a man has to work for a company which allows him a lot of time for activities relative to the society," he added.

There was more, but it added up to the same thing, as we WESTERN INDUSTRY editors discovered. To be successful a chapter must have the right ratio of users to vendors . . . it must have officers in a position to give more than an average amount of time to chapter activities . . . management must be brought into contact with chapter members and made to realize that it's to their advantage to support the efforts of professional societies.

You could probably add valuable advice. We wish our editors could have talked to each one of you members separately. But we couldn't, so the next best thing to do is to make sure you learn from both your own and other people's experience.

A successful chapter doesn't just happen. It takes hard work and active participation. You've got to believe in what you're doing. Dick Briggs will tell you that's true, and so will Chas. Long and Ben Hunt. We know, because we asked them.

BEN HUNT: "... there was no work horse who was able to devote the necessary time. And the structure of the chapter was wrong in the first place ..."



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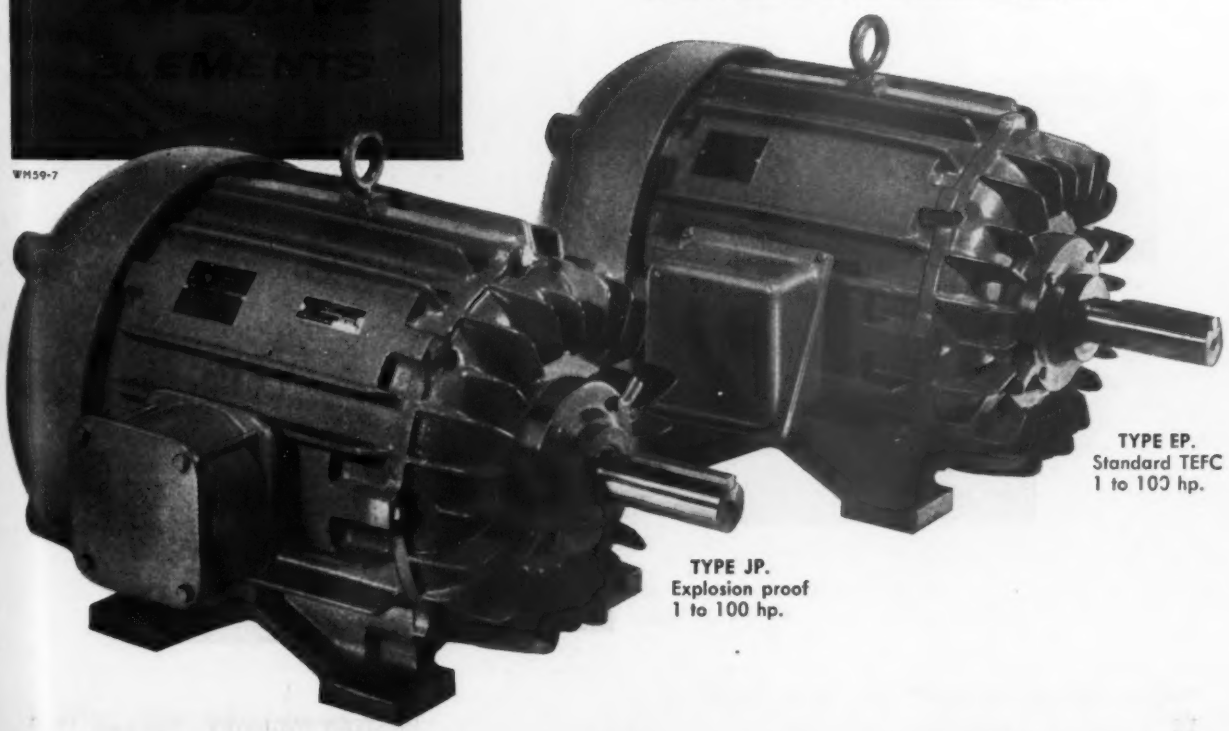

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TYPE JP.
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1 to 100 hp.

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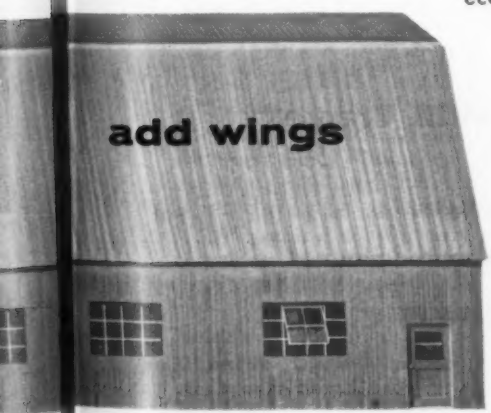

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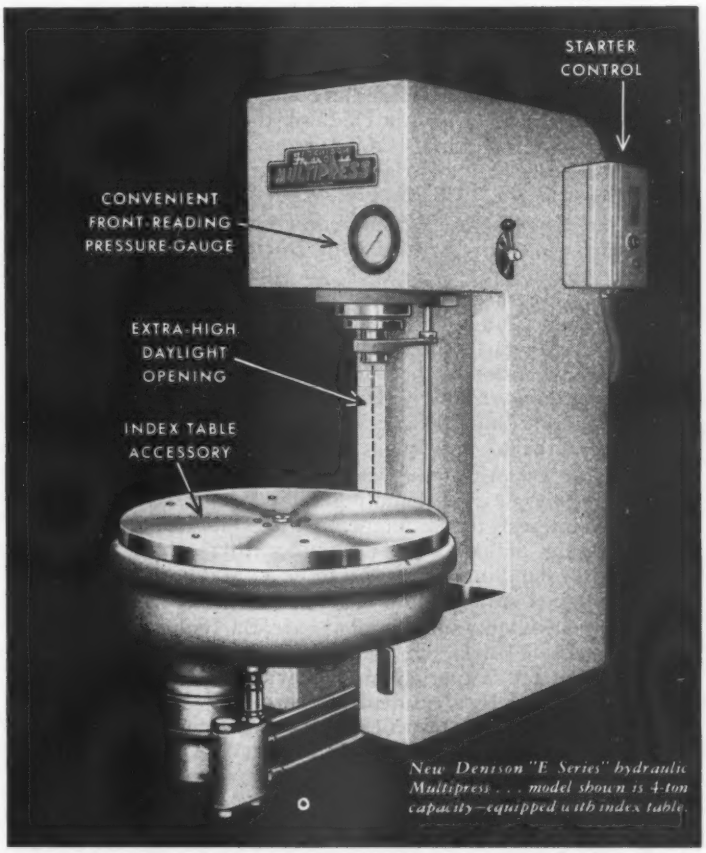
DENISON *Announces...*

NEW 2 to 8-ton **"E-SERIES"** Multipress line

- *BENCH PRESSES WITH BIG PRESS PERFORMANCE*
- *LOW-COST REPLACEMENT FOR OUT-MODED FLOOR PRESSES*
- *MORE TONNAGE PER DOLLAR...MORE DAYLIGHT FOR WIDER TOOLING RANGE*

FOR 101 PRESSING JOBS . . . *new "E Series" Multipress packs maximum big press performance in bench press space. 4-ton Multipress is shown above on rigid, lightweight bench accessory.*



New Denison "E Series" hydraulic Multipress . . . model shown is 4-ton capacity—equipped with index table.

HERE'S WHY IT'LL PAY YOU to check your production against the features of Denison's new "E Series" hydraulic Multipress line—

- **BIG PRESS PERFORMANCE** in a bench model size. Ram speeds: Closing up to 1450 ipm. Pressing up to 570 ipm. Return up to 920 ipm.
- **MORE DAYLIGHT** than comparable presses ... 18" opening adapts extra-wide range of tooling.
- **SAVES FLOOR SPACE**... compact design (16" x 26" x 49") can do floor press jobs in bench press space.
- **GREATER TONNAGE** for its size than any comparable press.
- **MOBILITY**... makes operations more flexible. Fast and easy-to-move *anywhere* in your production area.
- **MANUAL OR AUTOMATIC OPERATION**... Can also be equipped with Denison accessories—including feeds and index tables.
- **LOW-COST**... designed expressly to *replace* outmoded, heavy floor presses *and still do the job.*
- **OPERATING FEATURES**... oil smooth hydraulic power system . . . completely self-contained unit . . . rapid cycle time . . . fast, simple setup . . . interlocked safety controls . . . precision-controlled, adjustable ram pressures.

THE SECRET of Denison's new "E Series" hydraulic Multipress line is in this production-proved fact: Properly applied lower pressures produce better quality products—*more efficiently and with less scrap*—than misapplied higher pressures. Construction and control features of the "E Series" Multipress are designed to give *maximum performance at lowest possible cost.*

Write for full details in Bulletin M-34.

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. . . for more details, circle No. 9 on Reader Service Postcard

FINAL PLANS are drawing to completion for the Fourth Annual Materials Handling and Packaging Conference scheduled for March 26 on the Stanford University campus. Almost 200 persons representing all elements of industrial activity in the West were drawn to the 1958 conference.

First on the program for the conference will be a combined panel on "Unitization." **Doctor Lincoln Fairley,** director of research of the International Longshoremen's and Warehousemen's Union (ILWU), will be among panel members and will tell of his findings in the field of containerization.

The second session of the morning will be a combined discussion on "New Developments in Materials Handling and Packaging and How to Present New Ideas to Management."

Afternoon sessions of the conference will include two devoted to materials handling subjects and two of special interest to conference registrants from the packaging industry. Of particular interest to the materials handling industry will be a "Materials Handling Panel on Warehouse Layout".

Among scheduled panel members are **Ed Beuter,** who is in charge of layout and general operations of all Zellerbach Paper Company warehouses, **Robert Thomas,** Vice President in charge of Warehousing Operations at Certified Wholesale Grocers Company in Los Angeles and **F. B. Stewart,** district manager, U.S. Steel Supply Div., San Francisco.

A simultaneous session devoted specifically to industrial packaging, will cover the subject of "Dynamic Packaging". This session will be led by **W. S. Mielziner,** president, Impact-O-Graph Corp. of Cleveland, Ohio. The second packaging session of the afternoon schedule will be devoted to "Dynamic Testing of Cushioning Materials". This subject will be discussed by **Paul Larmour** and **Max Hill,** both of Lockheed Aircraft Corporation in Sunnyvale, Calif.

The second materials handling panel of the afternoon will be devoted to discussion of "In-Plant Handling". Leading this panel will be **M. Real** of Continental Can Company and **L. J. Dellwig** of Blake, Moffitt & Towne Company.

Sponsors of the annual technical affair are The Bay Area Chapter of The American Materials Handling Society, The Golden Gate Chapter of The Society of Packaging and Handling Engineers, and The Central California Chapter of the latter technical society.

Members of the steering committee for the 1959 Industrial Materials Handling and Packaging Conference include Chairman **Robert Stevens,** Fibreboard Paper Products Corp. and representative from the Golden Gate Chapter of the Society of Packaging and Materials Handling Engineers; **Alvin C. Hamre,** E. C. Buehrer Associates, Inc., and representative from the Northern California Chapter of the American Material Handling Society; **William Conrad,** Acme Steel Company and representative of the Central California Chapter of the Society of Packaging and Materials Handling Engineers; **Robert Sherry,** Martin Brothers Container and Timber Products Corp. and representative from the Central California Chapter of the Society of Packaging and Materials Handling Engineers; **Robert Morris,** Western Pacific Railroad Company and representative from the Golden Gate Chapter of the Society of Packaging and Material Handling Engineers; and **Stanley Bober,** Roll-Rite Corp. and representative of the Northern California Chapter of the American Material Handling Society.

Those seeking more detailed information may contact Robert Stevens, Fibreboard Paper Products Corp., San Francisco, who is acting as general chairman for the conference, or Stanley Bober, Roll-Rite Corp., Oakland.

•

MORE NEW DEVELOPMENTS to boost production in Western metal industries than ever before are promised for the rapidly approaching 11th Western Metal Exposition, March 16-20 in Los Angeles' Pan-Pacific Auditorium and connected pavilions.

Ray T. Bayless, acting secretary and temporary manager, American Society for Metals, Cleveland, made this prediction as he reviewed plans for the big metals working show.

Bayless said more than 350 Eastern and Western firms will be represented in the exhibits. Practically every booth, he continued, will be loaded with industrial and metals know-how ready for immediate application.

Chester L. Wells, exposition manager, said the show affords opportunity for the West's metals technical men to examine and compare new metals, metal products, processes and systems.

Time spent in the show, he stated, will bring about better industrial production, faster output and decided economies in fabrication.

The show will be loaded with new ideas for aircraft, missile, rocket, satellite, electronics, petroleum, chemical and general industries.

As in the past, showgoers will be invited to pass their production problems on to engineers from all parts of the country, who will have places in their booths. Wells said these men will be pleased to take on these problems with a view to solution.

The show will be presented by American Society for Metals with cooperation of more than 20 Western sections of national technical societies. Their members will receive invitations to attend the show on all its five days.

Programs of benefit to Western metal working firms will be presented at the 11th Western Metal Congress on the same five days in the Los Angeles

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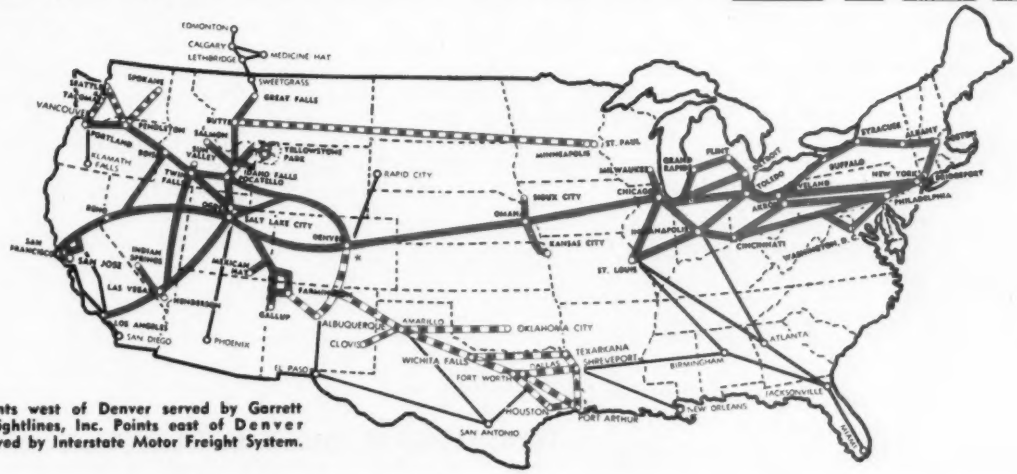

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Ambassador Hotel, announces **Ted DuMond,** coordinator of sessions.

Two full days—March 19-20—are set for ASM programs under DuMond's arrangements on the subject "Explosive Forming."

"Reasons for Use," "Areas Where Practicable," "Materials Formable," "Energy Sources," "Energy Transmittal Media," "Dies and Die Materials," and "Applications" are topics.

Four other days of technical sessions will be offered by ASM, four by the American Welding Society, five by the Society for Nondestructive Testing and two by the Metals Branch—Southern California Section, American Institute of Mining and Metallurgical Engineers. The programs will run concurrently.

•

TWENTY-FOUR SESSIONS and approximately 76 papers will mark the Western Joint Computer Conference slated March 3 through 5 at the Fairmont Hotel, San Francisco. Also, there will be 38 exhibitors and 64 booths.

The meeting is sponsored by the Institute of Radio Engineers, The American Institute of Electrical Engineers, and the Association for Computing Machinery.

Fee will be $6 for members; $7 for non-members; $2 for students.

Proceedings will be sent to each registrant. The cost is included in the registration fee.

Registration hours are 6 to 9 p. m., March 2; 7:30 a. m. to 5 p. m., March 3-4; 7:30 a. m. to 1 p. m., March 5.

Further details may be obtained from **William C. Estler,** 965 Lincoln Ave., Palo Alto, Calif.

Report on national conventions

AMHS-SPHE

ON THE MERGER: There are still a few details to be worked out and agreed upon. However, merger of AMHS and SPHE still appears imminent. We'll report more details as arrangements are worked out.

ON MATERIAL HANDLING SHOWS in the West: The Material Handling Institute expressed definite interest in cooperating with the American Material Handling Society in the matter of regional shows. Results of a detailed survey of market potential was made to the delegates with a recommendation that regional shows be started upon an experimental basis in 1960. That means that the West could expect a material handling show each year, starting in 1960.

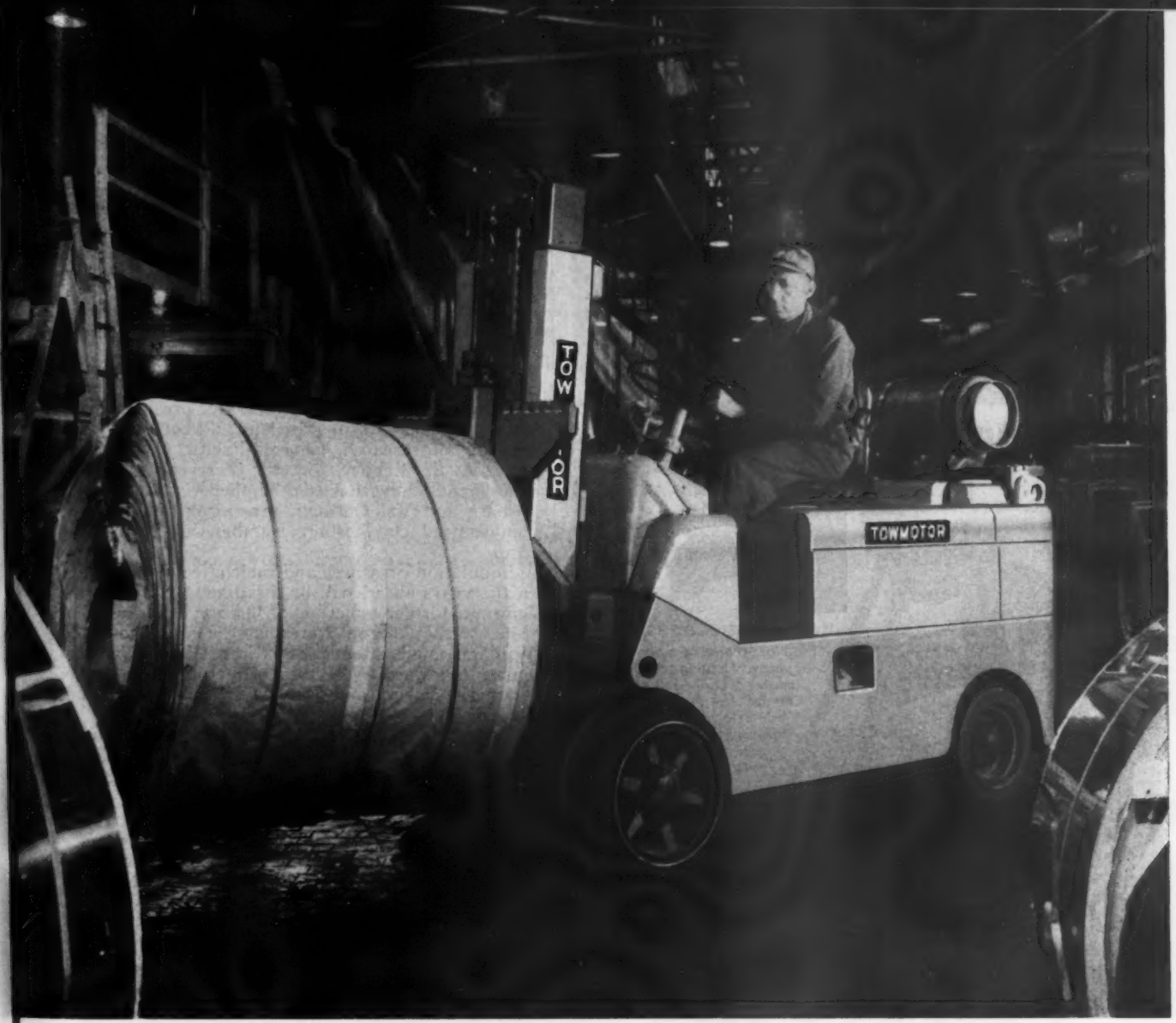
(Pictures of the conventions appear in our news section)

"THE NEXT 100 YEARS IN FORESTRY" will be the theme of the Centennial Forestry Conference scheduled Feb. 20 and 21 at Oregon State College.

Speakers will outline what the decades ahead will bring in forest management, engineering, and products utilization. The conference is open to the public.

Opening day speakers will include:

Dean George S. Allen, University of British Columbia, who will be moderator for discussions on



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biological research in the years ahead; **Leo A. Isaac,** Portland, retired forest service official, trees for the future; **Philip C. Johnson,** Missoula, Mont., Forest Insect Laboratory; **Vidar J. Nordin,** Forest Biology Division, Canadian Department of Agriculture; **Harold J. Lutz,** Yale University, forest soils; and **Virgil H. Freed,** Oregon State College, forest chemicals.

Research needs in the years ahead will be previewed by **Robert W. Cowlin,** director of the Pacific Northwest Forest and Range Experiment Station, and **Thomas Vaughan,** director, Oregon Historical Society, will trace the background of Northwest forestry and forest industries.

Second-day speakers on wood utilization will be **Alfred Hall,** Madison, Wis., Forest Service Laboratory, moderator; **R. P. Conklin,** vice president, Cascades Plywood Corp., Portland; **Robert W. Hess,** director of research, Georgia-Pacific Corp., Portland; **A. S. Gregory,** director of research and development, Weyerhaeuser Timber Co., Longview, Wash.; and **Val Gardner,** manager of fabricated lumber products, Rosboro Lumber Co., Springfield, Ore.

Population pressures and their effects on forestry in the years ahead will be discussed by **Charles A. Sprague,** former governor of Oregon and now publisher of the **Oregon Statesman,** Salem; **Thomas J. Williams,** superintendent of Crater Lake National Park; and **Reed W. Bailey,** director of the Intermountain Forest and Range Experiment Station, Ogden, Utah.

Ervin L. Peterson, assistant secretary of agriculture, will be speaker for the annual Oregon State College Forestry Fernhopper banquet the night of Feb. 21.

•

A TECHNICAL PAPERS Contest in packaging and material handling was announced in Los Angeles by **S. D. Powell,** chairman of the Education Committee of the Society of Packaging and Handling Engineers, the sponsor.

Open to all packaging and material handling personnel, the contest is for technical papers on any subject related to industrial or military packaging or material handling. Originality, professional value, technical accuracy and presentation will be points judged by a panel composed of industry and university representatives. Judges' names will be announced later.

Prizes for $100 and $40 were announced for the winning and second best paper. More details can be obtained from **S. D. Powell,** Douglas Aircraft Co., TExas 0-1211, or by writing to Education Committee, SPHE, P. O. Box 22082, Los Angeles 22.

•

THE FIRST WEST COAST activity of the Industrial Management Center will take place March 23-27 at the Rodger Young Auditorium, Los Angeles.

The intensive one-week Plant Layout Training Course will consist of an integrated sequence of discussion and laboratory sessions.

Topics to be covered during the program are: orientation to the objectives of plant layout; production planning; planning the materials flow pattern; overall space planning; planning for material handling; planning individual work areas; constructing the master layout and checking and evaluating the layout.

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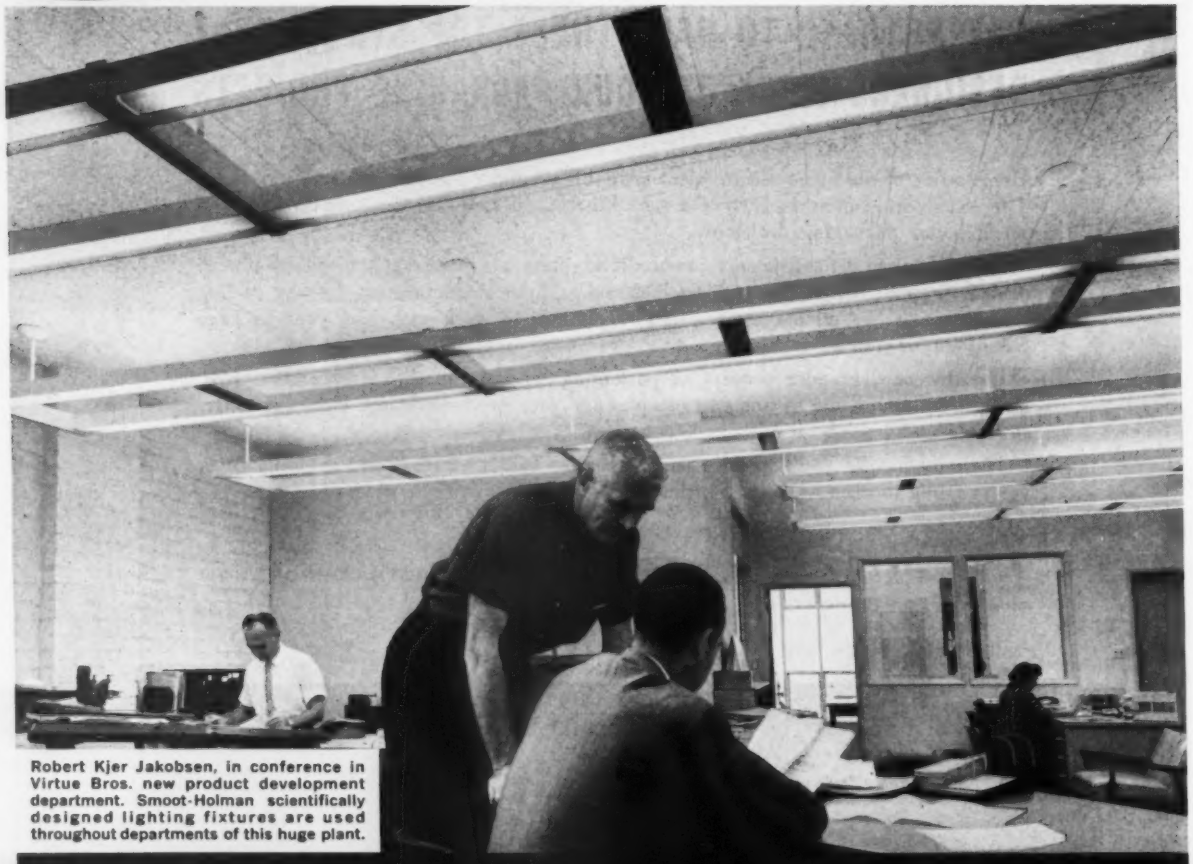
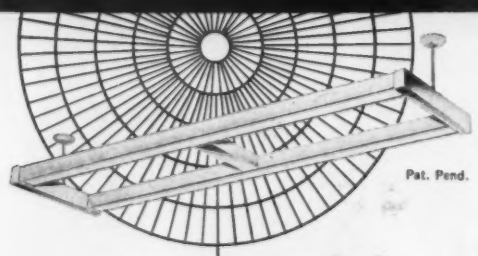


Robert Kjer Jakobsen, in conference in Virtue Bros. new product development department. Smoot-Holman scientifically designed lighting fixtures are used throughout departments of this huge plant.

scientifically designed **SMOOT-HOLMAN** lighting brings you

"TOMORROW'S LIGHTING TODAY"



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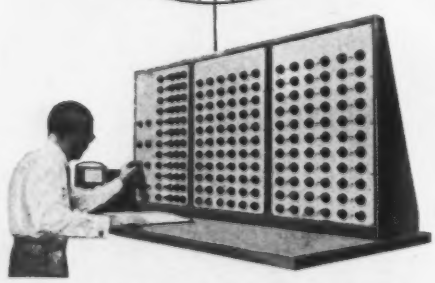

Smoot-Holman's advance design analogue computer. Used to achieve superior lighting design and unsurpassed lighting performance!

Robert Kjer Jakobsen, Chief Designer at Virtue Bros. Mfg. Co., has this to say about SMOOT-HOLMAN Lighting: "We're using Smoot-Holman Perfect Vision Luminaires in many areas in our office and plant because we feel they provide excellent light with no glare or sharp shadows. Before deciding on Smoot-Holman lighting fixtures we made a survey of a number of lighting installations and came to the conclusion that the Perfect Vision unit was the ideal one from many angles.

"In making our decision we took into consideration a number of things. Of first importance was to get a good lighting job ... which the Perfect Vision Luminaires give. Other important advantages we found in the Perfect Vision Fixture were ease of installation and maintenance. With maintenance labor costs what they are, we have to consider not only the initial cost of fixtures but maintenance as well. We have found that the Smoot-Holman Perfect Vision Fixture meets all our requirements perfectly."

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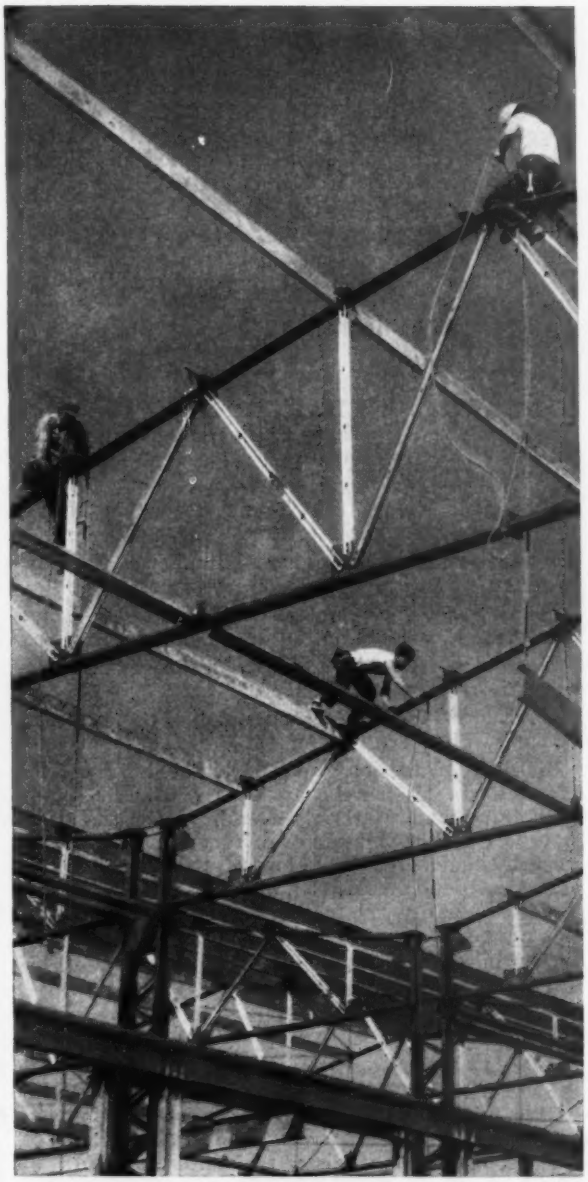

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In the laboratory sessions (about 2/3 of the time) the participant will actually perform each step in the layout planning process.

It is a working course, in session from 9 a. m. until 10 p. m. each day. Each participant will receive a full kit of materials for constructing a 5,000-sq. ft. plant layout, including grid sheets, templates, tapes, and miscellaneous supplies.

Also furnished will be a workbook, work sheets, reference materials, discussion outlines, and a copy of the text, "Plant Layout and Materials Handling," by James M. Apple.

To keep the training course at maximum personal usefulness to each student, enrollment will be limited to 30 participants.

Conducting the First Western Plant Layout Planning Course will be three men with wide experience in plant layout and material handling: **James M. Apple** of Lansing, Mich.; **W. B. Semco** of W. B. Semco & Assoc., Los Angeles, and **Robert C. Brady** of W. B. McClelland & Co., Cleveland.

Co-sponsoring the program is the Los Angeles chapter of the American Material Handling Society. Further information may be obtained from the AMHS headquarters, 8511 Sunset Blvd., Los Angeles 46, Calif.

•

THE ARIZONA CHAPTER of the Society of Packaging and Handling Engineers has announced the election of new officers.

They are:

President—**George A. Peters,** Reynolds Metals Co., Phoenix, Arizona.

Vice President (Packaging)—**Stephen F. Cassedy,** Hughes Aircraft Co., Tucson, Arizona.

Vice President (Materials Handling) — **Louis Edwards,** Navajo Freight Lines, Phoenix, Arizona.

Secretary—**Russell M. Carr,** Arizona Public Service Co., Phoenix, Arizona.

Treasurer—**Frank A. Biederman,** Biederman Associates, Phoenix, Arizona.

Subject of the program to be held by SPHE chapter No. 23 on February 16th will be "Military Packaging and Materials Handling vs. the Taxpayer". Speakers for the evening will be: **Frank A. Litfin,** Chief of Quality Control Division, Arizona Air Procurement District, and **James A. Massie,** Chief of Quality Engineering and Technical Methods Section, Arizona Air Procurement District.

The meeting will be held at Newton's Prime Rib Room, Phoenix, Arizona.

•

AUTHORS WISHING TO PRESENT PAPERS at the 1959 Western Electronic Show and Convention technical sessions to be held in San Francisco August 18-21 must register their interest by May 1.

Required are 100-200 word abstracts, together with complete texts or additional detailed summaries, which should be sent to the Chairman of the Technical Program: **Dr. Karl R. Spangenberg,** WESCON, 60 West 41st Avenue, San Mateo, California.

There will again be an IRE-WESCON Convention Record. Authors will be notified of acceptance or rejections of papers by June 1.

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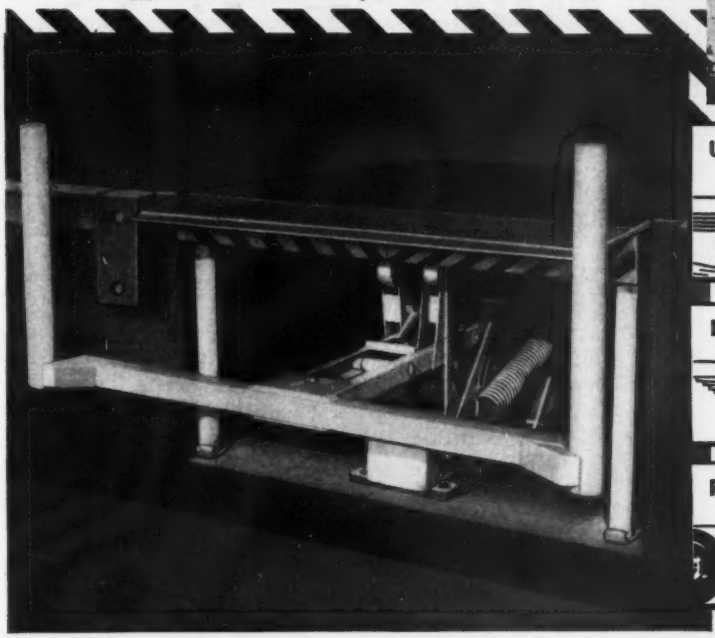

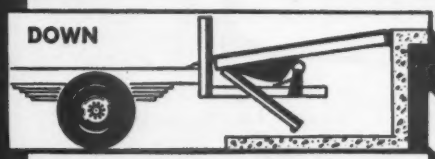

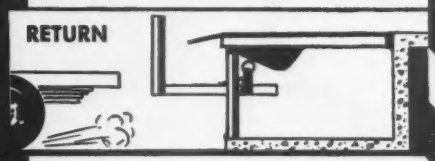

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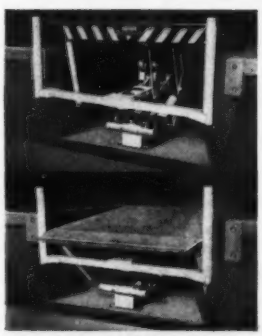

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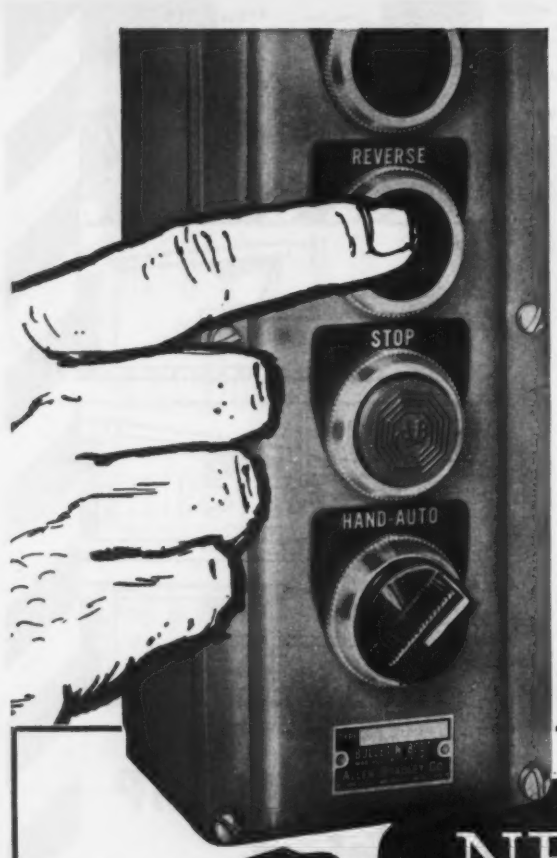

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Encapsulated Pilot Light. Oiltight Bulletin 800T.

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31 **Industrial Engineers in Small Plants**

34 **New Features in Gearmotors, Motorized Pulleys**

33 **Special 8-page Report on Lighting in Western Plants**

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Reciprocating Gravity Conveyors . . . To Break All Bottlenecks

BOTTLENECKS IN HANDLING are being eliminated in a Western plant and smooth flowing production insured — by reciprocating gravity conveyors. And their design is so new and different, patents are still pending.

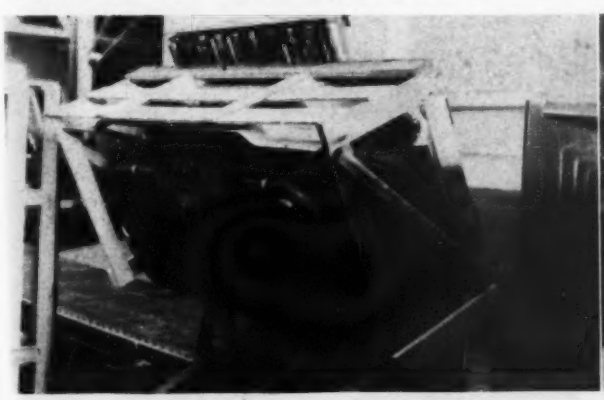
American-Standard Corporation's plant in Richmond, Calif., is characteristic of so many Western production facilities in that it is spread out horizontally instead of being built up vertically.

Adding to handling problems was the fact that packing the company's products, heating and plumbing equipment, took place in one part of the plant, while storage was done in another—and the two buildings were separated by a road.

Prior to installing the conveyor system, tubs were crated and piled—three to a pallet—to be taken by fork lift truck to a loading dock where they were placed on a semi-trailer truck. Given a full load, the truck then drove to the other side of the street where it was unloaded by other fork lift units and the tubs shuttled into the warehouse for storage.

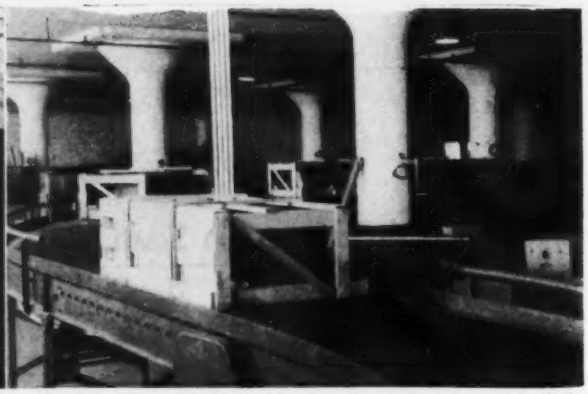
With the installation of conveyors, costs have been cut through eliminating one fork lift operator

HEAVY 300 lb TUB and CRATE are flipped quickly and easily onto the conveyor line by this automatic inverter. Note roller sections top center.



WIDTH OF THE ROLLER CONVEYOR sections is impressive, and when crated tubs reach first floor, they run on 15-ft radius sections around sharp curves.

CONVENIENTLY ELEVATED FOR EASY PACKAGING to be carried out without stooping, conveyors stand 20-ins off ground at working levels.



DRIVEN BY V-BELTS tubs round a 45 deg curve left, and then, almost immediately, round another 45 deg curve right before entering bridge.

and the semi-trailer operator who had previously sub-contracted the use of his time and truck.

Here's how the conveyor system works. . . Tubs are set on an automatic tub inverter, covered by a skeleton crate, and upended onto the first section of roller tread conveyor, elevated 20 in. off the ground.

The first 20 ft. of the journey toward the strapper is on these two 10-ft. sections of roller tread conveyor, with a rubberized surface. Rounding a 45-deg. curve the belt angles away to the right and settles onto a section which moves at the rate of 30 fpm. toward another section of roller tread conveyor and a second 45-deg. curve.

Just prior to rounding this second curve, the crated tub passes between two photo-electric cells which automatically control the rate at which the crates following are fed toward the strapper.

Another control mechanism to prevent jamming at the strapper, is a foot-operated high roll stop which allows the strapping operator to control individual units as they approach the strapping machine.

Tensioning of the strap, cutting it from the coil, making the welded joint and automatic strap feed are electrically controlled, requiring only one operator to keep pace with a steady daily flow of 430 tubs and 700 pieces of small ware.

Once the crate is secured by steel straps, it moves from the roller tread to a reciprocating gravity conveyor. This carries the tub at the rate of 20 ft. a min. through a tunnel leading from the packing room to the base of a belt conveyor which lifts the crate up a 22-deg. incline to the first floor. It is here that the system becomes unique in that it curves sharply twice before entering a bridge which carries the conveyor over the road dividing the packaging and storage buildings.

Fed by the belt conveyor lifting crates up the 22-deg. incline from the tunnel below, the 15-ft. radius conveyor sections are driven by V-belts round a 45-deg. curve left . . . and then, almost immediately, round another 45-deg. curve right into the bridge. They travel at 60 ft. per min.

Once on the bridge, crates are pulsed on reprocating conveyor sections 160 ft. across the road and into the storage building, where they are carried on roller sections elevated 15 ft. above the floor of the warehouse.

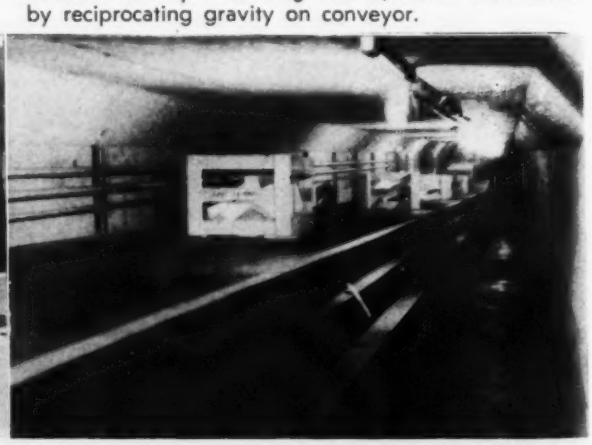
From there they move steadily down a 15-deg. decline belt conveyor which serves as an accumulation control point for lines feeding over the bridge. When the gravity semi-push conveyor—the last section of the system leading to where the crate is removed for storage—is full, the 15-deg. decline belt automatically stops.

Similar stop and start control mechanisms are located on the reciprocating conveyors, only these take the form of photo electric cells—because of the lack in uniformity of handling.

Reciprocating gravity conveyors are a new concept in conveying, and because of the novelty of design and the obvious advan-

STRAPPING IS AUTOMATIC and all operator has to do is control individual units as they approach by use of a foot-operated mechanism.

PULSING THROUGH THE TUNNEL prior to being lifted to first floor up a 22 deg incline, crates are moved by reciprocating gravity on conveyor.



tages, Mathews Conveyer Co., the company which designed and installed the complete conveyor system at American-Standard Corp., has applied for a patent on the design.

Construction consists of sections of gravity conveyor set at a slight slope and gently reciprocated, causing packages to surge down the conveyor. On standard gravity conveyor units, a slope sufficient to move a light package will cause a heavy package to run at excess speeds. With the reciprocating unit, accumulation is possible without excessive speeds or pressures.

It will convey a rough crate and a smooth tote box on the same conveyor with equal facility. Likewise, it will convey a carton of eggs, followed by a bathtub—without damaging either.

But most important as far as American-Standard Corp. is concerned, it means that stoppages at either loading, strapping or unloading points on the conveyor can occur without having to stop the movement of the system.

If the strapper has a breakdown, crates continue to flow along through the tunnel, up the incline to the first floor, across the bridge over the road and to line up behind other units waiting to be unloaded. When the strapper gets into action again, the reciprocating gravity sections enable the gap caused by the stoppage to be filled, without undue pressure being exerted as would be the case on steeply inclined regular gravity conveyors.

Although the standard speed of reciprocating gravity conveyors is 30 fpm., it can be changed by an adjustable feature in the drive which varies the length and speed of the crank motion drive. Installation of this conveyor system at American-Standard Corp. has eliminated what was previously a bottleneck in an otherwise smooth production operation.

In so doing it has not only increased ease and efficiency of handling, but has reduced costs by cutting labor requirements.

"An army of industrial engineers —armed with bar charts— can really boost production in a small plant . . . . . "

by Ken W. Smith
Chief Industrial Engineer
United Control Corporation

RECENT TRENDS have proved one thing to industry in the West—that highly efficient production techniques and rigorous production control are no longer for mass producers only.

Cut-backs and stretch-outs in military spending put a lot of marginal, inefficient operations out of business. But this was not the case at United Control Corp., Seattle, where, despite relatively small end-unit production, detailed industrial planning and production control are considered vital.

With more than 250 end items, all carried on current production schedules, special attention has to be paid to making sure parts are available—when and where they are needed.

Production runs on end items at United Control can vary from five to 500 units per month, and total production time may range from two to 250 man-hours per unit. Production activity can be described as a three-step process: fabrication of bits and pieces, sub assembly and top assembly.

These three phases of production can be broken down further by work centers, which include sheet metal fabrication, machine shop fabrication, welding, metal finishing, component assembly, plastic potting, painting, functional testing, photo etching, and many others. Also, there are centers which specialize in the build-up of amplifiers, radio noise filters, temperature transducers, circuit modules and other sub assemblies and system components.

Production schedule times are extremely short, ranging from 60 to 120 days from inception of design to delivery of the first production run. Detailed planning is an absolute requirement, which places heavy responsibility upon the industrial engineering group. As a result of short lead times, general manufacturing often takes place concurrently with prototype or pilot runs.

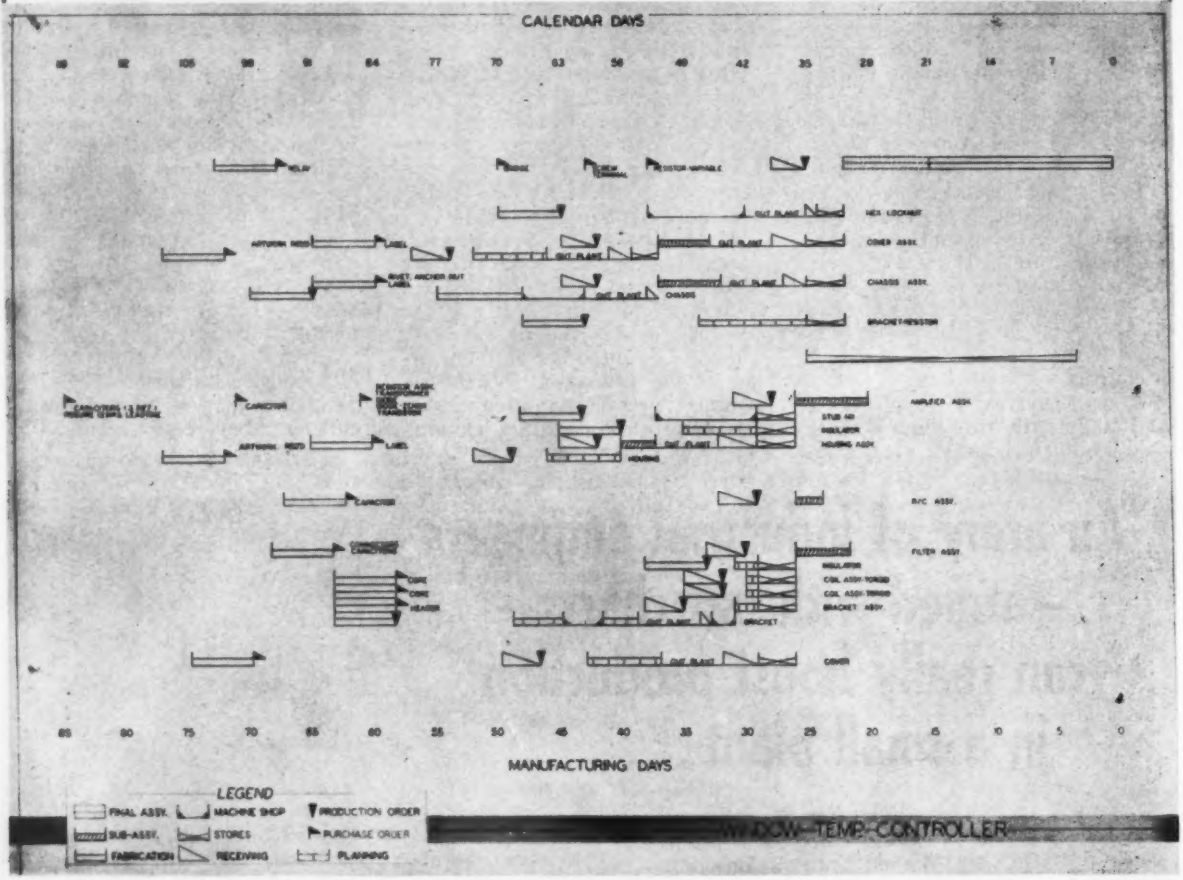
To assure that the two types of production are integrated properly, United Control places joint responsibility for production control on four groups . . . industrial engineering, production control, tool and process engineering and facility engineering.

These four groups work between the design engineering group on the one side and the manufacturing department on the other. This multiple responsibility is successful only when close coordination and effective communications are maintained.

The responsibility for coordination and communication falls on industrial engineering, which approaches the problem by splitting it into two parts. The first part is to integrate the manufacturing cycle with design engineering to minimize lead time. The second is to provide support and service to the manufacturing departments as necessary.

The best communications tool which industrial engineering has in coordinating with other groups is the **bar chart.** The bar chart concept has been adopted and modified by United Control to meet the company's special needs. A wide variance in production runs requires close attention to

THE BAR CHART—as shown here—can be a potent weapon in the battle for production.



the detail to be developed in the charts for individual products. The time over which total programming is developed often is short, when compared to charted programs in other industries, and in any given month there may be as many as 35 new items being phased into production.

As a result, the bar chart may be applied only during the initial production run and the period when the new product is pushed into regular production after the so-called model shop run has been completed. This limited use of the bar chart is due to the cost and time involved in up-dating all of the charts in use at one time. As soon as normal production is achieved, the charts may be abandoned. At this time, normal shop load and scheduling control is substituted to meet production schedules.

Charts are developed on the basis of a normal production schedule for one month. Should a particular product demand special attention due to a schedule acceleration or delays in design, procurement or tooling, then a chart may be revised so that a special expediting program can be set up. Thus, the bar chart becomes a tool which is used in conjunction with status reports to provide a graphic portrayal of the problem areas and their relative significance to the over-all production program.

The contract sales department has found these bar charts to be useful in reviewing delivery commitments made to customers, and copies of the bar chart for a given unit often are forwarded to the customer. Many departments supporting the manufacturing operation, including stores, purchasing, quality control, personnel and maintenance make use of the bar charts to plan their work schedules in the weeks ahead.

There is nothing mysterious about bar charts since they are based on elementary principles. The United Control charts are laid out on a time scale of days, with ten squares equivalent to five working days, or one working week. Saturdays and Sundays are not shown as normal work days, though they may be used to pull a tight program in under the wire.

In-process times include normal shop activities and a delay factor, which is based on current shop load and special conditions.

When completed, the bar chart depicts engineering, planning, prototype activity, parts fabrication and outside process procurement. Special attention is given to sub assemblies and fabricated parts used in more than one end item. Activity on these multiple usage parts is dovetailed, cutting down lead-time requirements, but imposing tighter production controls. Sub assembly activity on concurrent items may begin halfway through the fabrication process time, if the part fabricated is one which is completed as a continuous process.

Scheduled manufacturing times which appear to be abnormal to the customer or contract sales personnel can be reviewed at any time, and adjusted if possible.

The industrial engineering function of service to the manufacturing department includes application of a work simplification

program utilizing time study techniques, work sampling, methods improvement, and development of manufacturing controls. In the first category, great savings can be achieved. In one instance, the efforts of one industrial engineer over a period of six weeks resulted in net savings of 4,000 man hours in one plant center.

As a further service to manufacturing, industrial engineering conducts performance evaluations. Each manufacturing operation is given a specific value, either in dollars earned or earned manhours. This taken in relationship to the actual hours expended results in a performance factor for a given manufacturing center.

If a manufacturing center performs work equivalent to 80 earned hours, but expends 100 actual hours, their performance factor is 80 per cent of standard. When this information is accumulated and processed, it becomes an effective tool in locating areas of low performance. Also, with proper handling, it can be used as added motivation for supervisory personnel, resulting in improved performance.

Maintaining efficient production control depends heavily on detailed industrial engineering.

United Control's employment currently stands at around 750 persons, and of this total 425 are in the manufacturing department, 150 in design engineering, and 175 in administrative and general office classifications. The last figure includes 53 people who are engaged in the work of industrial engineering. The present breakdown of industrial engineering and the tasks assigned to the various groups is as follows:

1. The chief industrial engineer's staff, which is made up of four people.

2. The industrial engineering systems group, made up of four people, which is responsible for data processing, inventory control, procedures and labor cost estimating.

3. The industrial engineering services group, made up of three people, which is responsible for production programming, time-standard development and performance evaluation.

4. The production control group, with 12 people, which maintains production order control, tool control, shop loading information and carries out the expediting function.

5. Material control, 26 people, which releases requisitions to purchasing for parts and processes procured out-plant, and also requisitions fabricated details, parts and sub assemblies from the company's own manufacturing departments. The material control group also manages stores and its inventory records.

6. The tool and process engineering group, made up of three people, is responsible for production processing, process investigation and coordination, tool coordination and design, and facility tooling.

7. Facilities engineering, with one architectural engineer, is responsible for planning and directing alterations to existing facilities, and coordinating with management and outside architectural firms on expansion.

Faced with the need to continuously introduce new products and improve old products, United Control has concentrated a major portion of the responsibility for maintaining a flexible and efficient manufacturing operation on its industrial engineering group. And as the products become more complex to meet the rigorous requirements of the missile and space age, industrial engineering must undergo a continuing process of change to keep pace.

New power for gearmotors, pulleys

Western conditions make unusual demands of power equipment. Here's how problems were licked at a huge bulk handling installation

NEW FEATURES were introduced in the gearmotors and motorized pulleys that power the belt conveyors at the recently enlarged $2,000,000 bulk material handling facility at the Port of Stockton (Calif.).

The features were necessary to provide heavy-duty operation in limited space under abrasive-dust conditions.

This abrasive condition comes from the iron ore, coal, petroleum coke, nickel ore, barite, pyrites, potash and other bulk materials.

To give you an idea of the power problems involved, here's how the material handling setup works:

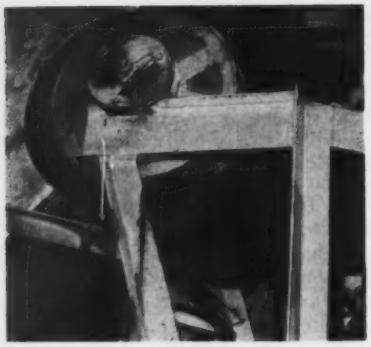
Unloading from rail gondola cars is by rotary car dumper — the only one at a West Coast port. This giant overturns a car and sets it upright in 50 seconds. Car switching is by motorized trackmobile; the entire time cycle from dumping one car to dumping the next is only five minutes, including car-switching.

From the hopper beneath the car dumper the material is belt-conveyed up a 175-ft. incline to a 44-ft. high trestle on which runs the 810-ft. distributing belt conveyor at 400 ft. per min. through a double-boom traveling tripper-stacker that places the material at any desired point in the quarter-million-ton storage yard. Chem-jet dust suppression spray fluid is piped to all discharge hoppers.

When a ship arrives for loading, bulldozers push stored material into ground-level hoppers in concrete covered pits — from which the reclaiming conveyors transfer the load through an 8 ft.-diam. corrugated-culvert tunnel to a 750-ft. (500 ft. per min.) reversible conveyor, located underneath the trestle.

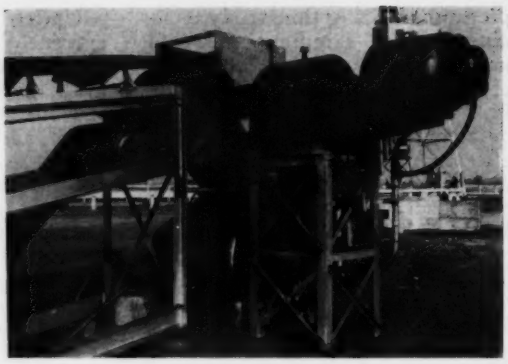
What happens then depends on whether the ship to be loaded is berthed at tower 1 or tower 2. In either case the load is conveyed to the proper inclined conveyor, boom, and "elephant trunk" for placement in the hold of the ship. Well over one mile of 36-in. wide, 5-ply rubber conveyor belt is used. Rubber skirting on all boom runs adds substantially to rubber investment.

The record for loading a single ship at tower 2 from storage is 16,902 tons of iron ore in 15 hr., 40 min. This output may be somewhat increased if two ships are loaded at the same time, using both towers. Ship loading need not interfere with car unloading and storage because the conveying systems are independent.



LEFT—Where's the motor? Inside the pulley! The 50-hp unit is totally enclosed fan-cooled, mounted on trunnions within the pulley. Gear case is wholly independent of pulley.

RIGHT—Lo-Speed reversing gearmotor, driving north end of conveyor. Tower No. 2 is in the background.



Gearmotor features

The gearmotors that drive the long-run and inclined conveyors have wound rotors with slip-rings for connection to external starting resistance, thereby increasing torque at starting along with gradual increase of speed of the fully loaded conveyor. This assures maximum efficiency and highest power factor when running, and permits use of a smaller frame-size motor.

The fully enclosed gear-reduction units are integral with the motor, hence always in alignment, compact, and space saving. AGMA Class II reduction units are used, suitable for moderate-shock conditions. These have larger gears and bearings than Class I units of same horsepower.

The 750-ft. reversible conveyor has gearmotors at each end, operates in parallel. They are so far apart that they are fed from different transformer banks, but overload relays and no-voltage releases are in series on the control side so it is impossible for one motor to operate alone. A reversible application of induction motors connected to the same load requires careful matching of slip characteristics of the motors so they will divide the load equally.

The P.P.T.'s (Packaged Power Terminals)

This is a recent development of the motorized pulley — in which motor and gearing are **inside** the pulley, thereby enabling large horsepower to be used in cramped quarters so often found with conveyor drives.

Features of the P.P.T. are (1) gear-reduction unit is self-contained and not a part of the pulley itself, hence oil tightness is not related to condition of the pulley-support trunnions; (2) all gears are helical (spiral) type; no spur or planetary gears are used, nor is the inner face of the pulley used as a part of the gear case; (3) ventilating air enters one end of pulley and exits from the other, hence ventilating holes are not required in face of pulley—thereby preventing entry of muck from underside of belt, and (4) no overhang outside of limit-line of pulley required, other than just enough to support trunnion clamps.

Because only helical gearing is used, 96% mechanical efficiency is claimed at rated load. By dropping the sub-frame on which the trunnions are mounted, the entire motor and drive unit may be removed from the pulley endwise without disturbing belt. Packaged Power Terminals are manufactured by J. D. Christian Engineers, San Francisco.

New kind of expendable pallet revolutionizes Western shipping

EXPENDABLE PALLETS have been developed by a San Francisco company, which may revolutionize shipping practices in the West.

Extremely light in construction, the 5-lb. pallets are made of wood-reinforced paper board. Carrying 31 to 36 sacks of cement weighing 94 lb. each, they are recommended for stacking three-high—which means the bottom pallet carries a load of more than 5 tons.

Until now, there has been a custom in the cement industry that buyers furnish their own conventional heavy pallets for every load. With the introduction of expendable pallets, companies can provide the pallets on all shipments of cement without charge.

Changeover will increase freight savings and payload by eliminating more than half a ton of wooden pallet dead weight on every standard flat-bed haul. Also eliminated will be expenses for pallet repairs and sack breakage due to splinters or protruding nails.

Dealers will be able to pick up, store, and deliver sack cement without having to maintain pallets of their own. And the pallets, although designed to meet a specific cement industry need, are equally adaptable to any other industry which ships sacked, bagged or carton goods.

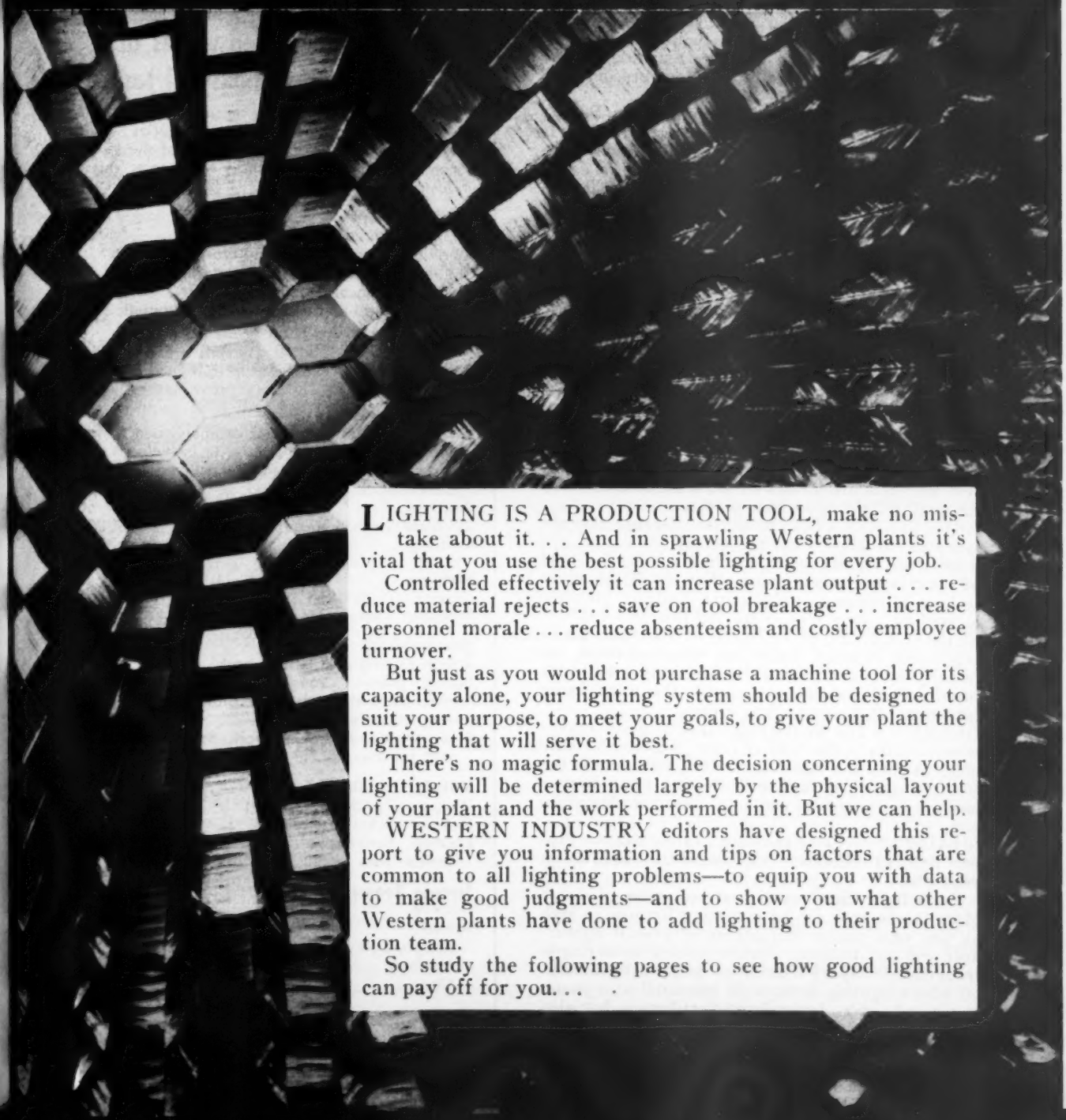
The new pallets, designed to be handled by standard fork lift equipment, were developed by **Harold A. Lovegreen,** Calaveras assistant sales manager, with the assistance of pack house foreman, **Jack Vettorazzi,** trucking foreman, **Charles Evans,** and purchasing agent, **B. B. Woodward, Jr.**

The company has applied for patents, and is planning to distribute the pallets through its recently organized subsidiary, Calco Supply Co. (See page 76, December WI).

The wood-reinforced corrugated paperboard pallets are discussed by **M. J. London** (left), and **Harold A. Lovegreen.**

A Special Western Industry Report

LIGHTING IN WESTERN PLANTS



LIGHTING IS A PRODUCTION TOOL, make no mistake about it. . . And in sprawling Western plants it's vital that you use the best possible lighting for every job.

Controlled effectively it can increase plant output . . . reduce material rejects . . . save on tool breakage . . . increase personnel morale . . . reduce absenteeism and costly employee turnover.

But just as you would not purchase a machine tool for its capacity alone, your lighting system should be designed to suit your purpose, to meet your goals, to give your plant the lighting that will serve it best.

There's no magic formula. The decision concerning your lighting will be determined largely by the physical layout of your plant and the work performed in it. But we can help.

WESTERN INDUSTRY editors have designed this report to give you information and tips on factors that are common to all lighting problems—to equip you with data to make good judgments—and to show you what other Western plants have done to add lighting to their production team.

So study the following pages to see how good lighting can pay off for you. . .

What's available . . . ?

WHEN SELECTING the source for your plant lighting, you can choose from three types: **fluorescent, incandescent,** or **mercury vapor.**

Fluorescent is used for general lighting in well over 90% of Western plants because it's most efficient, practical and economical. Incandescent and mercury vapor can be used to advantage in special applications or as part of an overall lighting system.

As there's a very good chance you will be using fluorescent lighting in your plant, let's look at some of the points to be considered when planning this kind of installation.

To be effective, light should provide illumination in both the right **quantity** and of the right **quality.**

Quantity refers to the amount of light available on the working surface. Needs will depend on the type of work, and such variables as workers' ages . . . whether the task is intermittent or continual, etc.

Recently the Illuminating Engineering Society published the findings of an 8-year research study it had sponsored to determine scientifically the quantities of light needed for various seeing tasks. These showed requirements ranging from 10 to 1,000 footcandles.

In the machine shop rough bench and machine work was rated at 50 footcandles, while precision grinding was up as high as 1,000 footcandles. Sheet metal work varied from 50 footcandles for ordinary bench work to 200 footcandles for scribing.

Testing was done at the Vision Research Laboratories, University of Michigan. In a lab 56 seeing tests were set up representing a wide variety of jobs.

Some of the results are printed in the table on this page.

Quality of illumination however, cannot be defined or measured so easily. It depends as much on the surrounding area as on the light source itself, but there are factors which must be considered for quality lighting in your plant:

BRIGHTNESS CONTRAST — Because the eye takes in far more than the actual work, and eye discomfort results when contrast within the field of view is too great, every effort should be made to keep contrasts to a minimum. Fixtures properly located go a long way in solving this problem.

SURFACE REFLECTANCES — To insure better brightness balance, finish on room surfaces, especially walls and ceilings, should have a high diffused reflectance consistent with the work being performed and surrounding areas.

GLARE — It's distracting. Direct glare occurs when an area in the field of vision is uncomfortably brighter than the visual task. Reflected glare is the result of polished surfaces reflecting light. Proper location of equipment can help overcome this problem.

SHADOWS — Can constitute a safety hazard. Proper lighting diffusion will minimize shadows in your plant.

Good light distribution and reduction of direct glare can be achieved by mounting fixtures as high as you can—within limitations of overall appearance and maintenance. Continuous-row mounting is recommended as the most all-around practical method where lighting level is 50 footcandles or more. It not only gives better light distribution, but also saves on wiring and installation costs.

Spacing of fixtures to attain uniformity of lighting depends on footcandle level desired and fixture mounting height. For even distribution of light over an entire area, **follow the rule of thumb that spacing between rows (or individual fixtures), should not exceed mounting height.**

For fluorescent units on machine tools, make certain there is no possibility of the mounting bracket slipping. It could be dangerous to both the operator and the product.

There's a spring-tension socket made by the Swivelier Co., Inc., which will not work loose and which maintains constant tension. Spring-tension sockets and swivels compensate for vibration and wear and adjustments can easily be made by use of wing nuts or set screws. Built-in stops prevent twisting of wires and eliminate shorts.

New recommended values of illumination for industrial tasks

To illustrate the wide range of footcandle levels now recommended for industrial applications, we have listed below some of the levels recommended for seeing tasks common to many industrial plants.

Machine Shops	
Rough bench and machine work	50
Medium bench and machine work, ordinary automatic machines, rough grinding, medium buffing and polishing	100
Fine bench and machine work, fine automatic machines, medium grinding, fine buffing and polishing	500
Extra fine bench and machine work, grinding—fine work	1000
Sheet Metal Works	
Miscellaneous machines, ordinary bench work	50
Presses, shears, stamps, spinning, medium bench work	50
Punches	50
Tin plate inspection, galvanized	200
Scribing	200
Welding	
General illumination	50
Precision manual arc welding	1000
Woodworking	
Rough sawing and bench work	30
Sizing, planing, rough sanding, medium machine and bench work, gluing, veneering, cooperage	50
Fine bench and machine work, fine sanding and finishing	100
Material Handling	
Wrapping, packing, labeling	50
Picking stock, classifying	30
Loading, trucking	20
Inside truck bodies and freight cars	10
Storage Rooms	
Inactive	10
Active	
Rough, bulky	10
Medium	20
Fine	50

Lighting at work . . .

AN OUTSTANDING Western remodeling job at Pacific Gas & Electric Co.'s offices at the corner of Mission and Fremont Streets, San Francisco, was done by simply rebuilding roof lighting fixtures.

The new ceilings are composed of suspended T-bar frame-units that hold ceiling and lighting fixtures in an integrated system, with all ductwork above the new ceilings. An average of 100 footcandles is maintained on all working levels by carefully planned use of fixtures manufactured by the All-Brite Corp.

In another case, **Jerry Schoen,** president, Metwood Manufacturing Co., Gardena, Calif., led his company out of the dark after carefully considering how he could best put light to work on his production team.

"We called in our lamp supplier," Jerry said, "and he made a survey of our plant. After careful consideration we agreed to 200-footcandles, since we work to very close tolerances in the machine shop and punch press areas.

"We weren't at all sure, even then, that lighting was going to pay profits, so we agreed to a 20-day audit 30 days before the new lighting system was installed . . . and a 60-day waiting period before a second 20-day audit. Results showed an increase of 16% in machine time efficiency and a reduction of 26% in rejects and re-works.

"A year later we made a similar audit covering more ground than the first. We found that although machine time efficiency hadn't changed much, rejects and re-works were reduced 32%. Lost-time accidents that year were off 52% and employee turnover down 58%. The last two figures represent enough savings to more than pay for the new lighting fixtures."

In making a specific cost comparison, Mr. Schoen tried to get down to basic fundamentals of equipment used by Metwood Mfg. Co., and came up with the following: Prior to purchasing the new lighting system, the company had installed a Cincinnati milling machine at a gross cost of $13,750. At the time of purchase, machine time charge was $6 per hr., or $48 per 8-hr. shift. Labor cost in man-hours was approximately $20 per 8-hrs.—resulting in gross earning of $28 per 8-hr. shift.

In comparison, the lighting system's gross cost, including a new 400-amp. service, was a little more than $10,000. The cost of operating the lighting system, including power, taxes, depreciation, washing every 12 months, and relamping every two years, was estimated at a little over 54 cents per hr.; and in 29 months tube mortality was 7 and ballast none. Very commendable.

Similar savings resulted at the Trulove Iron Works in El Segundo, Calif., when the firm used fiberglass panels for sidelighting and skylighting. Over $75 per opening was saved on construction costs, because Filon plastic nested with the corrugated metal and could be nailed up without using any kind of sash.

Previously, conventional glazing of the light source had never been entirely satisfactory, since it supplied some areas with intense, glary light, while other areas were in shadows. As a result, artificial illumination was needed throughout the working day.

Now, because of the panels manufactured by Filon Plastic Corp., of El Segundo, evenly diffused light, with no glare or shadows, is assured. Also installed were eleven 150-watt floodlights, but the panels have been so effective that after two years the floodlights still haven't been used.

Such natural light illumination is satisfactory where production does not require extremely precise tolerances. But at the Helipot Corp., Costa Mesa, Calif., production is pinpointed to .0002-in.—and that requires special lighting.

In its older plant, Helipot Corp. was operating with about 50 footcandles of general illumination. In some places bad shadows were slowing production. Tests were made with a pilot installation producing 150 footcandles—and within three days production had gone up 20%.

For its new plant, the company is using about 180 footcandles, by installing 800 milliampere Smoot-Holman Co. industrial units with about 12% upward light. About 30% of the employees work on items so small that microscopes must be used; at these locations supplementary lighting is still used, bringing the overall level to around 400 footcandles.

Or take the lighting problems facing a very large operation like the new 500,000-sq. ft. Marchant Calculators plant in Oakland, Calif.

Making sure an area larger than 10 football fields is lighted so that optimum production is assured requires special planning. A balanced 277-volt system (requiring no additional transformers) maintains between 90 and 100 footcandles in the whole plant. A 120-volt system maintains 65 footcandles in offices.

The same kind of careful light planning has gone into Convair's giant 550,000-sq. ft. San Diego warehouse, which uses 1,000 mercury vapor lamps . . . enough to light the highway all the way between San Diego and Los Angeles.

Costs of Lighting Systems

TO ESTIMATE COSTS of your lighting system, check the following four basic factors:

Initial fixture cost—Include original cost of lamps, and remember the longer the life of your lamp, the lower its overall cost.

Installation cost—Include labor and wiring materials. Choose fixtures which provide more pre-assembly features . . . that way there are fewer parts to put together on the job.

Maintenance costs—Include primary cost of lamp, replacements and cleaning of equipment. Planned periodic maintenance of your system will keep it in top-notch condition.

Operating costs—Figure it on an annual basis, include power consumed, amortization, interest on your investment, taxes, insurance etc. Usually you will have to extend it over a couple of years.

New trends in lighting...

THE DISTRIBUTION SYSTEM, as well as the lighting fixtures, at the new Purity Stores, Ltd., 254,000-sq. ft. warehouse in Burlingame, Calif., illustrates the coming trend for industrial lighting.

Lights inside the building operate on 277-volt circuits. Mercury lamps that have been color improved are used to give an appearance more closely resembling those of daylight, incandescent lights. The mercury vapor lamps have been installed on message cables and are clamped to the trusses so that they can be readily re-located or removed as the aisles are changed to meet different storage requirements.

In the past most lighting systems operated at 120 volts. It was necessary to transform higher potentials to lower levels at considerable cost in order to suit the requirements of the lighting system. This additional cost frequently caused substandard lighting to be selected.

In modern Western plants, however, where the trend is toward higher intensities, it has become necessary to lower this economic barrier. Higher operating voltages is one answer. The 277-volt fluorescent fixture allows direct connection to the 277/480-volt systems currently provided for most new plants.

But before you begin operating on this higher voltage, make a detailed comparison of total annual costs of other possible systems. Take a look at the relative merits of incandescent, fluorescent and mercury vapor units. The basic elements in comparing different lighting systems may be broken down to **initial** and **operating costs.** Either of these may be the dominating factor, but they can be combined into a "total cost" indicator.

Computing such total costs for various systems must be predicated on the following common assumptions if comparisons are to be valid:

(a) Equal illumination levels in all cases. Adjustments must be made to equate all costs on this basis;

(b) Equality in amortization rates of initial investments as well as for interest, taxes, insurance, should be maintained at 10% for write-off of investments and 5% for the remaining items;

(c) Operating conditions should be equal for each system under consideration, e.g. electric power rates, burning hours per annum and starting frequencies;

(d) Each system should be cleaned in whatever manner is appropriate;

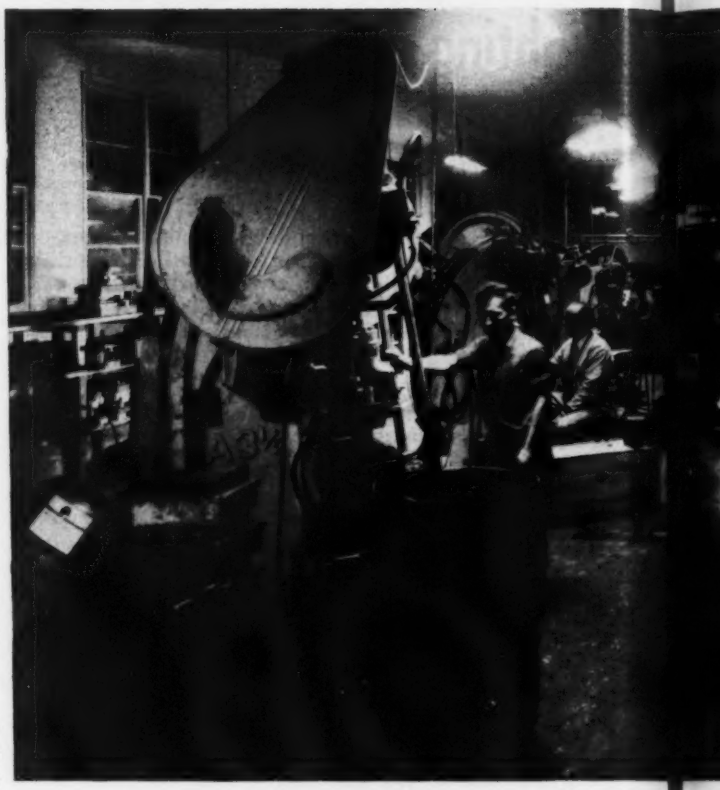
(e) For estimating installation, cleaning and re-lamping, labor rates should be uniformly taken;

(f) Consider a uniform fixture mounting height of 14 ft.;

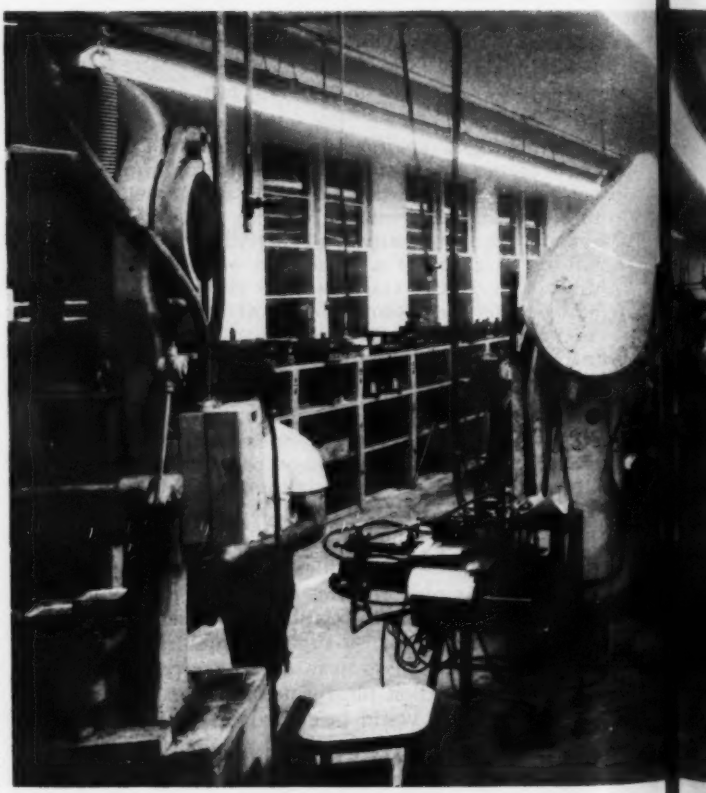
(g) Make sure that physical proportions of the areas compared are similar and that reflectance factors do not vary.

If you go wrong, take a look at the Illuminating Engineering Society's Lighting Handbook — it should put you right.

And remember that, as with any other piece of equipment in a plant, the quality of the lamp plays an important role. Many plant managers overlook this fact, and are interested only in the initial cost of the lamp itself. To determine if any real difference existed, one interested user recently conducted a study of the lamps of two different manufacturers.



BEFORE good lighting was installed . . .



AFTER installing correct lighting level . . .

. . . rejects were high and efficiency low.

. . . rejects reduced by over 32%.

Personnel in the factory concerned had commented on the greater maintenance difficulty of one lamp as opposed to the other. It was decided that figures would be kept on the cost of operating both lamps over the period of almost one year. The results showed that one lamp cost $106.82 less to use (considering the overall figures of all lamps of each type in use in the plant).

A good example of the coming trend in lighting installations is in use at International Business Machine's new plant at San Jose, Calif.

The tract on which the two manufacturing buildings are built is 210 acres in all. Building #001, used primarily for machining, contains 64,000 sq. ft. of floor space, while building #005, used for assembly, is just about three times as big—200,000 sq. ft. Both buildings are rectangular and both are one-story.

Lighting throughout both manufacturing buildings is fluorescent. Panelboards are 3-phase, 4-wire, operating at 120/208-volts or 277/480-volts, depending on requirements. Lighting in office areas ranges from 50 to 75 footcandles, and production area lighting from 65 to 85 footcandles. Outside lamps on parking lots and streets are color-corrected mercury vapor, while walkways and outside floodlights are incandescent.

Emergency lighting is provided by wet-cell battery units that light breaker and meter sections in power centers and exit areas.

But with even the best lighting possible in your plant you may come across complex problems of reflection. Images can be created on small, intricately shaped parts, to cause interference with close-tolerance grinding. Experiment may prove that images cannot be eliminated by changing mounting heights, arrangement, louvers or diffusers.

The solution may be to install straight color-corrected mercury-vapor lamps containing newly developed primatic reflectors with a 45 deg. cut-off and low brightness. Because of smaller number and smaller size of lamps, number and size of images is greatly reduced. Even though brighter than before, these images can be pinpointed, then blocked out by small, opaque shields located to suit each operator.

Maintenance in lighting...

ADDS TO YOUR PROFITS.

Changing all of the lamps in an area at the same time has accomplished for lighting maintenance what mass production did for the manufacturing business.

Maintenance studies in a large number of Western plants have shown that it takes approximately 20 min. to replace a single burned-out lamp. By replacing all of the lamps at one time, this unit time can be reduced to 3 min. per lamp. At today's high cost of labor, this can mount up to substantial savings.

It would be impractical to replace all of the lamps in an installation when the first one failed. Some median point must be selected.

Assuming lamps that fail prior to a group change will be replaced individually, **the most economical time to group replace fluorescent installations is when 17% of the lamps have failed.**

An incandescent relamping after 11% of the lamps have been replaced will effect the maximum

saving. Different percentages between fluorescent and incandescent are due to a difference in the rate of failure or mortality between these two light sources.

The cleaning of lamps and fixtures is important, too.

In many cases, after the novelty of a new lighting system has worn off, it's forgotten except to replace an occasional burnt-out bulb. Dirt, however, is collected continuously, and, after a period of time, some installations are producing less than 50% of the light they produced when new.

It would be cheaper to install only half as many fixtures and keep them clean if you are going to allow dirt to cut effectiveness.

To determine how much dirt is collecting on lamps and fixtures, keep a careful check on them for a specific amount of time. Then average footcandle readings in the area before the fixtures are cleaned, and the average readings after cleaning.

From these, figuring a percent is easy—and by relating this to known production costs, it is simple to determine how much money is being wasted per year in electricity and amortization expenses.

In addition, any desired cleaning program can be studied and weighed against the cleaning cost to determine which schedule suits your own particular circumstances to the best financial advantage.

As an illustration of how dirt losses can be determined, assume a large industrial operation is experiencing average dust depreciation of 4%. It has a $50,000 lighting system being amortized over a 10-year period at a rate of $5,000 per year for 1000 twin lamp commercial-type fixtures.

Power rate is 2 cents per kilowatt hour and the lights are on 40 hours a week, or 2,000 hours a year. A spot of quick figuring will show you that the operation is losing 19 cents per year of each dollar of its annual lighting investment of $5,000. This amounts to $950 worth of value not received because dust has been allowed to collect.

And that's not all.

Put your figuring hats back on. There's a waste of electricity amounting to 3 cents per year for each cent per kilowatt hr. power rate and each month of the cleaning cycle.

To find the total power being wasted, it is then necessary only to multiply the 3 cents by 2 cents for the power rate. This results in 6 cents which should then be multiplied by 12 for the present monthly cleaning cycle—which adds up to 72 cents.

Then multiply by 1000 for the number of fixtures in the system, which shows the annual power waste alone to be $720. The total value of the lighting system being wasted by cleaning only once a year amounts to $950 plus $720, or $1670—which is quite a hunk of money when you look at it any way.

Take heart, there are many ways to reduce fixture cleaning cost by adopting special equipment to meet the particular requirements of the installation.

Where fixtures are detachable, it is safer, easier and faster to take them down for a thorough cleaning of both lamps and reflectors. A few spare reflectors will save additional time necessary to wait for washed units to dry.

Since it is usually necessary to remove the lamps during a fixture cleaning job anyway, the doubling up of a cleaning and group relamping will minimize the cost of maintenance still further.

What might go wrong...

Various things. Just learn the symptoms. For instance, in fluorescent lamps:

Blackening—early in life . . . a defective starter causing prolonged flashing or on-off blink at each start. Ends of each lamp remain lighted—indicates a starter failure due to short-circuited condenser or welding together of the switch contacts. Wrong ballast used or one that is improperly designed.

Determining operating costs . . .

Operating cost in $1 per lamp per day =

$$\frac{W \times E}{1000}(A + B + C) + \frac{R}{7500}\left(\frac{A}{La} + \frac{B}{Lb} + \frac{C}{Lc} \cdots\right)$$

W = lamp and ballast watts

E = energy in $ per kwhr

R = lamp and replacement cost

A, B. C, . . . = periods of burning time in hours

La, Lb, Lc, . . . = standard lamp life for each burning period relative to lamp life at 3 burning hours per start is 7500 hr.

Assuming that a 40-w preheat lamp is burned continuously for a 9-hr working day and again for a half-hour at night; that the energy rate is $.015 per kwhr; that lamp cost is $.077; that replacement cost is $.050 per lamp; and that lamp and ballast watts are 47.75, here's how to determine whether lamps should be turned off during a fifteen minute "break" period when they are not needed.

Cost when left burning - - - - - -

$$= \frac{47.75 \times 0.015}{1000}(9 + 0.5) + \frac{0.77 + 0.50}{7500}\left(\frac{9}{1.43} + \frac{0.5}{0.52}\right)$$

$$= 0.00680 + 0.00123$$

= $0.00803 per lamp per day or 8.03 mills per lamp per day

Cost when turned off - - - - -

$$= \frac{47.75 \times 0.015}{1000}(4+4.75+0.5) + \frac{0.77 + 0.50}{7500}\left(\frac{4}{1.1} + \frac{4.75}{1.16} + \frac{0.5}{0.52}\right)$$

$$= 0.00662 + 0.00147$$

= $0.00809 per lamp per day or 8.09 mills per lamp per day

Blinking of relatively new lamp . . . possible lamp fault. Defective starter. Ballast rating wrong. Low circuit voltage. Loose circuit contact. Low temperature or draft hitting tube.

Slow, or no starting effort . . . Broken cathode, open contact or air in lamp. Poor contact at socket. Low ballast rating. Low circuit voltage. Poor circuit conditions.

Overheated ballast . . . Indicates short circuit in capacitor. Short in wiring. High circuit voltage. Poor ventilation in fixture housing. Deactivated lamp left in fixture.

Initial blackening at end . . . Cold lamp or cool draft hitting lamp. Mercury deposits should vanish as lamp is operated.

Dark streaks along lamp . . . Indicates gray feathers of mercury generally on lower or cooler parts of lamp. Rotating lamp 180 deg. may evaporate these due to increased warmth.

Flicker or swirling . . . New lamps may flicker but this should clear up as the lamp ages. Starter may be at end of life. Wrong ballast may have been used to operate lamp. By turning lamp off a few seconds swirling should cease.

Apparent color difference . . . May be due to reflector, wall or room finishes. May be difference in brightness between old and new lamps. Wrong color lamp may have been used. Lamp may be outside limits for color standards. May be due to cold or hot drafts on lamp.

Dense black spot about 1 in. from base . . . May occur near end of lamp life. If it occurs early indicates excessive starting or operating current.

Fluorescent lamp failures are often difficult to analyze due to many outside controls necessary for proper operation. In the event a lamp fails to function for a reason that is not immediately obvious, try these suggestions for tracing the cause.

1. Check the starter—by replacing it with one that is known to be good. Be sure the proper size is used and if it is of the reset type, be sure that the button is depressed. If fully automatic starters are used, a time delay is normal for resetting. The starter should be replaced with every second lamp for the most trouble-free operation.
2. Check the lamp—by turning gently in the sockets to assure good contacts. Replace inoperative lamp with one that is known to be good.
3. Check the fixture—to be sure the wiring to lamp holders and starter sockets is correct and tight. Look for grounds, short circuits and open circuits. Be sure lamp-holders are aligned and secure.
4. Check the electrical supply—as fluorescent ballasts are designed to operate at 118,236 or 277 volts. Operation beyond 5% from these values results in short lamp life, uncertain starting and damage to the ballast and starters.
5. Check the ballast—it may need changing.

There's a new low-temperature "C" sound-rated ballast for commercial high-output lighting installations which has recently been put out by General Electric Co. It is two in. shorter, over two lb. lighter and 3 to 5 deg. C. cooler than preceding models. It will operate at less than 90 deg. C. in a 2-lamp, 8-ft., louvered commercial fixture that is surface-mounted against an acoustic tile ceiling.

And there are many other time and money saving lighting fixtures and devices on the market to help you. You can find out about these by looking at the lighting manual section following this article. Read these manuals . . . they contain information you can use—when you really need it.

Comments from experts . . . .

"Two recent trends are worth noting," says **John M. Ackerman,** Western consultant. "The first is that more emphasis is being placed on higher output sources. Fluorescent and mercury vapor lighting produce approximately three times that of modern incandescent lamps per watt input power—and there's promise of more. Objections to the use of higher output light sources are higher initial cost and excessive brightness unless properly shielded, but mass production will probably reduce the first of these objections, and careful research should come up with glare shields that tone down extreme brightness.

"The second significant trend is the increased use of 277/480-volt, 3-phase, four-wire distribution systems. Where fluorescent or mercury vapor lamps are used, 277 volts without intermediate transformation may be used. Reduction in sizes of circuit protective devices, buses and conduits are savings which result.

"Increases in lighting loads coupled with increased use of motor driven equipment will make higher voltage distribution systems even more economical."

Roy C. Henning, manager of quality assurance at Eitel-McCullough, Inc., San Carlos (and consulting editor to WESTERN INDUSTRY) makes these observations:

". . . A blending of different light sources is an excellent way to attain special effects. My personal preference in lighting effects is a combination of fluorescent and incandescent. A popular combination that has always pleased my eyes was a recessed installation in which each unit consisted of a 150-watt incandescent lamp and a double bar of fluorescents of 40 watts each. . . ."

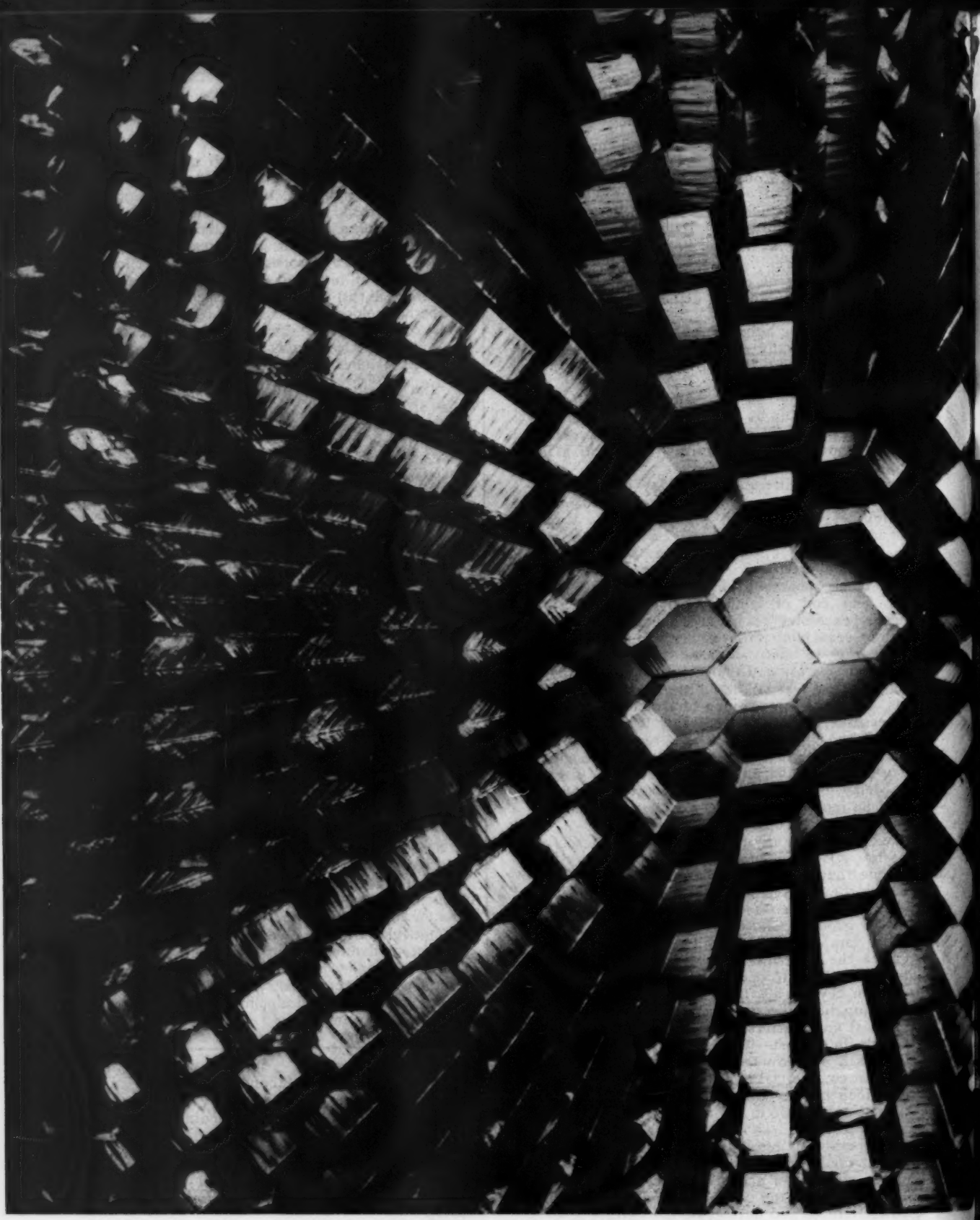
"One striking difference between the modern low level 'sheet' type of lighting and daylight, which it is supposed to simulate, is that daylight is 'point source' light and as such creates shadows. Shadows create body and third dimension for the viewer. My own office is lighted by fluorescent fixtures behind translucent paneling. The whole ceiling is an unbroken sheet of lighting. It sheds approximately 95 foot candles. It is positively monotonous. I have to use a desk lamp to give some contrast to the scene."

THERE IT IS. Think about it.

Just a few cents a day saved by the ability of workers to see more clearly and accurately will pay for the best lighting installation.

Even the slightest decrease in rejection will show an immediate profit on your lighting investment, not to mention decreased accident hazards and improved morale which results from eye comfort while working.

Keep these things in mind the next time you install new lighting. And, remember, treat it as you would any other valuable production tool—because that's what it is.



LIGHTING IN THE WEST — for Western products — is illustrated by this photograph of light shining through aluminum honeycomb core. Good lighting is essential in producing this and other Western products.

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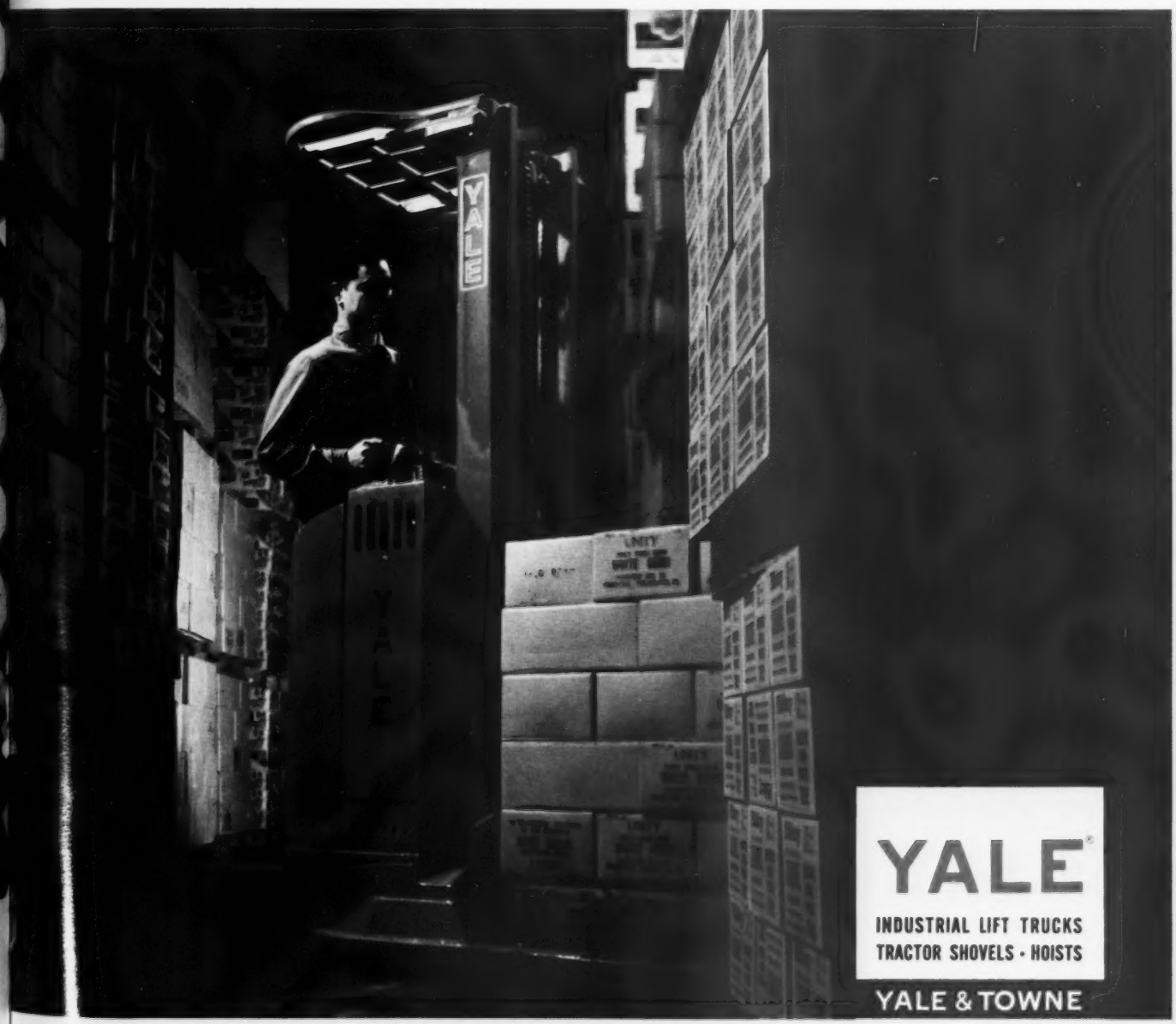
This new Yale narrow aisle truck is available in straddle and Extend-A-Fork models—in capacities of 2,000, 3,000 and 4,000 lbs. Standard 12-volt models also available. Contact your Yale representative or write for brochure #1535H. The Yale & Towne Mfg. Co., Yale Materials Handling Div., Phila. 15, Pa., Dept. RT 1-H.



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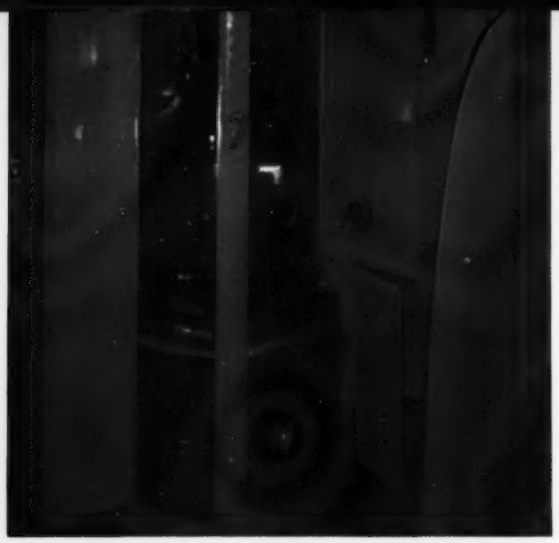

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Western Buyer's LIGHTING Directory

DAY-BRITE LIGHTING, INC., St. Louis, Mo.
General lighting products.
Branches
Calif., Santa Clara—P. O. Box 450, AXminster 6-6154

GENERAL ELECTRIC CO., Cleveland 12, Ohio
Fluorescent and mercury lamps, bulbs, etc.
Sales Districts
Calif., Los Angeles — South Pacific Sales Dist., E. C. Herron, 2747 South Malt Ave., RAymond 3-2541
Calif., Oakland—Pacific Sales Dist., J. W. Billings, 999-98th Ave., LOckhaven 9-3422
Colo., Denver—Rocky Mountain Sales Dist., J. P. Roger, 1863 Wazee St., AMherst 6-0285
Ore., Portland North Pacific Sales Dist., C. A. Rost, 2800 N. W. Nela, CApitol 3-2101

REVERE ELECTRIC MFG. CO., Chicago 48, Ill.
General lighting and electrical products.
Representatives
Ariz., Phoenix—R. E. Tweedy, 914 Madison St., ALpine 2-8163
Calif., Los Angeles—Maddox Sales Co., 914 East 3rd St., MIchigan 2306
Calif., San Francisco—Baxter Co., 101 Kansas St., MArket 1-8636
Colo., Denver—L. S. Reed & Co., 1018 Lawrence St., ALpine 5-1777
Ore., Portland — John A. Schulter, 411 Weatherly Bldg., BEmont 4-1211
Utah, Salt Lake—David A. Merrill, 192 North First St. E., AX 5-4631
Wash., Seattle — Robert E. Jones Co., 414 Dexter Horton Bldg., MAin 4830

SMOOT-HOLMAN CO., P. O. Box 4097, Inglewood, Calif.
Fluorescent, incandescent and mercury lighting.
Branches
Calif., San Francisco—55 Mississippi, MA 1-8474
Ore., Portland — 218 Builders Exchange Bldg., CA 2-1327
Representatives
Calif., Sacramento — M. P. Fenton, 1331 "T" St., GI 2-0857
Calif., San Diego—C. J. Bunce, 3664 Charles St., AC 2-2875
Utah, Salt Lake—J. R. Christensen, 247 E. 5th St. S.
Wash., Seattle—Free Scharr Marina Mart Bldg., 1500 Westlake Ave. No.

SWIVELIER CO., INC., Nanuet, N. Y.
Lighting fixtures.
Representatives
Ariz., Phoenix—B. H. Hartley, P. O. Box 4381, ALpine 8-2552
Calif., Los Angeles—Parrish & Justice Co., 1741 S. Hope St., RI 9-6028
Calif., San Francisco—A. R. Parker Co., 420 Market St., YU 2-4762
Colo., Denver—Gaer Sales Co., 1223 Quivas St., ALpine 5-7310
Utah, Salt Lake—The Darger Co., 211 S. 2nd West St., EL 5-2873
Texas, Dallas—G. E. Anderson, 1901 Griffin St., RIverside 1-5931
Wash., Seattle — Northwestern Agencies, 4130 First Ave. So., MA 3-8882

SYLVANIA LIGHTING PRODUCTS, a division of Sylvania Electric Products, Inc., 60 Boston St., Salem, Mass.
Incandescent, fluorescent, mercury, infrared, lights and fixtures.
Branches
Calif., Burlingame—1811 Adrian Rd., OX 7-3500
Calif., Los Angeles — 6505 E. Gayhart St., RAymond 3-5371
Colo., Denver—4700 East 48th St., FL 5-2303
Utah, Salt Lake City — 428 So. Main, EM 4-6144
Wash., Seattle — 3466 E. Marginal Way, MAin 2-6888

VERDA-A-RAY CORP., 615 Front St., Toledo, Ohio
Incandescent and fluorescent lamps and fixtures.
Branches
Calif., Los Angeles—1328 S. Santa Fe, TR 7961
Texas, Dallas—6115 Denton Drive., FL 7-4841
Representatives
Colo., Denver—W. Wexler, 1437 S. Fairfax, SK 6-1426
Utah, Salt Lake City—212 Beason Bldg., EM 3-4501
Wash., Seattle—3040 28th Ave. W., AT 2-6424

WESTINGHOUSE ELECTRIC CORP., Bloomfield, N. J.
Incandescent, fluorescent, mercury vapor and ultraviolet lamps.
Representatives
Ariz., Tucson—Hussar Electric Supply Co., 103 N. Park Ave.
Calif., Los Angeles—California Wholesale Electric Co., 2548 Yates Ave.
Calif., Los Angeles—RCA Victor Distributing Corp., 2027 So. Figueroa St
Calif., San Diego—Electric Supplies Distributing Co., 435 Second Ave.
Calif., San Francisco—Westinghouse Electric Supply, 201 Potrero, UN 1-5051
Calif., San Francisco—Zellerbach Paper Co., 534 Battery.
Colo., Denver—Mine & Smelter Supply Co., 3800 Race St.
Idaho, Boise—318 S. Capitol Blvd., 2-3531
Montana, Billings—302 N. 15th St., 2-0176-7
Nevada, Reno—Saviers Electric Products, 670 E. 6th St., FA 2-9134
Nevada, Reno—Western Electric Distributors, Inc., 6th and Evans Rd., FA 9-1131
Ore., Portland—815 N. W. 12th Ave., CA 2-9851
Utah, Salt Lake—210 Rio Grande St., DA 2-2441
Wash., Seattle—1051 First Ave. S., EL 7001

WESTON INSTRUMENTS, Division of Daystrom, Inc., Newark, N. J.
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Today's best LIGHTING manuals

. . . yours free, use postcard, p. 69

52-page roundup on lighting equipment

Floodlights, searchlights, aviation lighting, industrial lighting (explosion-proof, dust-ignition-proof, vaportight) are all included in this detailed manual. All units are pictured, along with a complete description of their specifications and applications. The thorough index in front should lead you right to the equipment you want. **Crouse-Hinds Co.**

. . . for your copy, circle No. 150

"Comfort for Industry" lighting fixtures

The CFI (Comfort for Industry) series detailed in this four-pager introduces a complete line of industrial fixtures covering every lighting requirement. Slotted apertures are provided in the tops of reflectors. Harsh ceiling contrasts are washed out—"hot spots" eliminated—visual strain largely avoided. CFI units in this booklet will accommodate all available types of fluorescent lamps. Complete specifications and dimensions are included, and pictures and diagrams show you how these lights can be of service in your plant. **Day-Brite Lighting, Inc.**

. . . for your copy, circle No. 151

168-page catalog of lighting fixtures

Called "lighting's most progressive catalog," this book contains complete lines of shielded and unshielded lamps . . . special industrial types . . . recessed fixtures and many others. Each fixture presentation has a quick-cost indicator which sums up price data. Also included are photometrics calculated by the Zonal interreflectance method. Other lamp information is presented in easy-to-use tables. The catalog was designed so that it will be a lasting reference source. It features the Dewey decimal system of page numbering—making it possible for the user to add pages in perfect sequence as new fixtures come along. Each book is numbered and registered so owners will receive automatic additions of new fixture information through the mail. **Lighting Dynamics.**

. . . for your copy, circle No. 152

Data folder on light measuring instruments

Safety engineers as well as maintenance men, lighting engineers and others will find some invaluable tools described in this four-page folder. The ever-increasing practice of mixing tungsten and fluorescent lighting and the arrangement of tubes in long lines, makes correct evaluation of the light very complicated without a fully corrected instrument. Included in the folder are pictures and details on foot-candle meters, illumination meters, sunlight meters, portable meters, service instruments and others. **Weston Instruments, Div. of Daystrom, Inc.**

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Preventing sun from entering windows

This eight-pager covers methods of preventing the sun's heat and glare from entering through windows. Brief case histories in the brochure demonstrate substantial savings in air conditioning tonnage, as well as improved lighting balance obtained with KoolShade. Highlights of KoolShade bronze construction are included so you can tell for yourself if this can work for you. **Reflectal Corp.**

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40 pages on durated lighting products

Color plays an important role in this 40-pager, showing you how different colored lights can work for you. Among these are deluxe white, soft pink, silver,

← for more details, adv. pgs. 43 and 44, circle No. 22 on Reader Service Postcard

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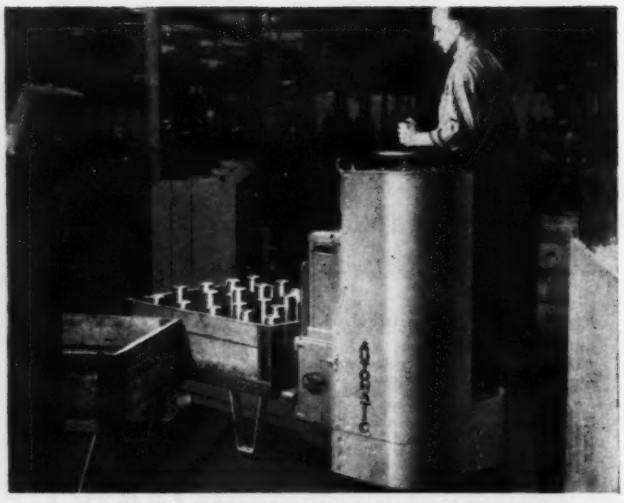

Transveyor low-lift platform and pallet trucks reduce aisle space and work easily in and out of trucks...are faster than the walkie type.
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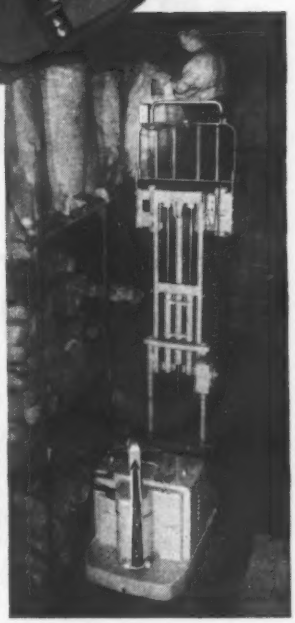

Transporter Cantilever-Type Stacker with remote-control mast and special platform expedites selection of orders. This truck performs all the functions of a rider-type machine at considerably less initial cost. More maneuverable for working in cramped quarters. **Model WST**...capacities from 1000 to 4000 lbs.

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LIGHTING manuals, cont.

colorama, ember glow, and many other colors. Other sections of the booklet deal with mill vibration . . . rough service . . . spot and flood lights . . . weatherproof, fluorescent, and others. Units are pictured and application data given. Also, the many charts and tables should give you the full details on any lighting fixture you'd need. **Verd-A-Ray Corp.**

. . . for your copy, circle No. 155

Universally adjustable lamps for industrial plants

Need to put a light on the right spot? You can—simply and easily with the lamps explained in this four-pager. It pictures and describes incandescent and fluorescent units for use on machine tools . . . assembly benches . . . inspection tables . . . desks and drafting boards. The universally adjustable feature of these lamps will make them stay at any angle—and will not let them drop down. **Swivelier Co., Inc.**

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50-page pocket manual on lighting maintenance

It's a good thing this guidebook will fit into your coat pocket, because you'll probably want to refer to it time and time again. It contains that type of practical information you can use. Sections deal with: advantages of good lighting . . . planning . . . quantity of light needed . . . recommended footcandle values . . . basic fixture and lighting types . . . quality considerations . . . room influences . . . quick lighting calculations . . . bulb shapes . . . incandescent lamp types . . . lamp life . . . fluorescent lamp operation . . . fluorescent installation . . . cleaning . . . light terms. The index at the back of the book will help you locate the information you want. And there's even a log at the back so you can keep a record of lamps installed and cleaned. **Champion Lamp Works.**

. . . for your copy, circle No. 157

12-pager on fluorescent, incandescent lamps

This booklet sets down a myriad of systems of lighting. There are plastic fixtures of all kinds . . . including 12-in. wide trouffers, 24-in. wide Mobilex and other types for all types of ceiling arrangements. The fixtures on page 11 should be especially helpful in solving your problems. Diagrams show how these fit into the picture. And the new paraflo troffers on the back cover show you how you can combine high comfort illumination and air distribution into one attractive functional unit. **Day-Brite Lighting, Inc.**

. . . for your copy, circle No. 158

16-page guide to lighting installations

Most of the questions you'll ask about lighting installations are answered in this handbook. It starts out with a table of recommended levels of illumination, then tells what fixtures are available. Other sections deal with reflection factor . . . maintenance factor . . . room index tables . . . light distribution curves . . . coefficients of utilization and listings . . . location of lighting fixtures . . . and step by step calculations for planning installations. **Crouse-Hinds Co.**

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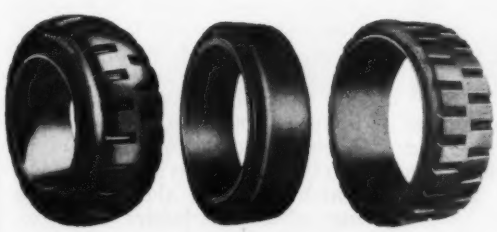
FOR DETAILS AND SPECIFICATIONS, ask your Monarch dealer ... or write direct ... for CATALOG MR-457.



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... for more details, circle No. 25 on Reader Service Postcard

COST REDUCTION IDEA-BOOK: part II

COST REDUCTION takes many forms—as in this easy handling method which saves 50% (see story at right). For other ideas of saving time and money under Western plant conditions, read the case studies in this section . . . and watch for further tips in our Know-How Notebook #1 in next month's WESTERN INDUSTRY.

Handling cut 50% by special design aluminum ladders

HANDLING TIME HAS BEEN CUT 50% at Blake, Moffitt & Towne's new warehouse in Portland, Ore., — by use of specially designed, manually-operated material handling equipment.

case study 79

The new warehouse was opened on April 28, 1958. It covers 109,700 sq. ft. —an operating area of 84,000 sq. ft. and reserve storage space of 25,700 sq. ft. — large enough to present any firm with a handling headache.

Add to this 1,608 storage bins in the printing area, and 3,060 bins housing resale merchandise. and it becomes obvious that a highly streamlined handling sys-was needed.

The company already had in use 3 lift trucks, 10 hand jacks and 5,200 pallets for handling its products. But additional hand equipment was needed.

Walter Martinson, general warehouse manager of the company and the man primarily responsible for the layout of the new Portland plant, turned the problem over to the Rol-Away Truck Manufacturing Co., Inc., Portland, whose engineers came up with specially designed equipment.

Large size, three-shelf aluminum "stock picker" ladder trucks were produced with plywood shelves in aluminum angle frames and special heavy duty casters for easy rolling in any direction. Each truck is equipped with a safety step unit's lock device which prevents the units moving while the ladder is in use.

Further proof that
Ampco does it better at Burbank...

Here Ampco Metal lengthens life of cylinder

The large-diameter cylinder in this King Hydraulic Press (capacity, 65-300 tons) has an Ampco Metal inner-liner to protect against excessive wear. Both cylinder and liner are precision machined and shrink-fit assembled.

44 years of know-how equip Ampco's Burbank personnel to meet specialized requirements like this with castings in alloys most foundries shy away from — high-iron aluminum bronze, alloy copper, pure copper, and bronzes hard enough for die work. You specify the size — a few ounces to 5,000 lbs. Complete facilities include pattern shop, sand and centrifugal foundry, machining and forging facilities.

Ampco at Burbank gives you prompt delivery on

Sand castings	Centrifugal castings
Machined parts	Forgings

... and off-the shelf delivery on these Ampco Metal products:

Ampco Aluminum Bronze	Resistance-welding Products
Sheet and plate	Extruded rod and bar
Cent. cast semi-finished bars	Spot welding electrodes
Extruded rod	Holders and accessories
	Seam welding wheels

The platen in the King Hydraulic Press, built by King Machine & Manufacturing Company, Los Angeles, California is equipped with eight Ampco Metal gibs to maintain perfect alignment.

Write for Bulletin 73W

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Capacity of the special trucks is over 500 lb. The area worked by only four Rol-Away "stock pickers" in the Portland warehouse consists of two sections, covering an area of approximately 11,850 sq. ft. According to the operating superintendent, **C. A. Berg,** four men are assigned to these units, and he estimates that they handle 50% of his firm's total orders.

Ladders on the units make it possible for the operator to walk in perfect safety on the top shelves of the trucks for high level work, yet the trucks are still light enough to be easily pushed —fully loaded—in any direction.

Time savings by using "stock pickers" is estimated by Berg at 50%.

New packaging idea reduces charges, handling hazards

PACKAGING CHARGES were reduced 10% . . . ease of handling increased . . . and handling hazards reduced . . . when Canoga Corp., Van Nuys, Calif., solved a tough packaging problem.

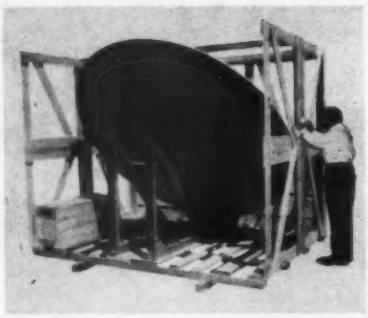
case study 80

It all centered around the company's product, a 10-ft. dia. radar reflector. When shipped, the unit was not only unwieldy, but it had to be protected more carefully than a crate of eggs.

Formerly, the reflectors had been laid flat for packaging—resulting in an excessively wide package that had to be shipped by rail. Truck freight could not be used due to inconvenience of routing on designated roads and the high cost and bonds and permits for highway transportation.

Standing the reflector on edge would not have answered the problem, for then the package would have exceeded the legal height requirements for motor freight.. So engineers designed a skid that would hold the reflector at an angle, and can be easily handled by a fork lift.

The reflector is set at the proper angle and secured to the skid, and the packaging operation completed by packing the antenna, nutator and dehydrator and webbing them to the base.



By setting the reflector at an angle, Specification Packaging Engineering Corp. was able to gain large packaging savings.

The entire unit is then crated to afford maximum protection. The crate mounting has the same ratio of strength to the reflector as has the reflector's permanent mounting.

By setting the reflector at an angle, the crated unit was kept within the legal width and height requirements for door-to-door trucking service without special highway permits, and freight costs have been reduced.

Although the crate itself has been increased from 605 cu. ft. to 760 cu. ft., the net weight was reduced 64 lb., with a corresponding saving in freight costs. The hazard of excessive width was also eliminated by keeping the unit within the sides of the track.

The packaging was engineered by the Specification Packaging Engineering Corp. of North Hollywood, Calif.

Specialty valves keep cool as temperature rises

VALVE TEMPERATURE RANGE has been increased by a newly developed heat resistant diaphragm material. Valves equipped with the new material may be used in continuous service at temperatures up to 250 deg. F.

case study 81

AVSCO valves, manufactured by the Automatic Valve Systems Co., are hydraulically activated, remote control units with a special backless design. The valve disc that opens and closes is an integral part of the diaphragm assembly — and maintenance is cut since no lubrication or packing is required.

Hydraulic pressure applied through a small control tube closes the valve . . . pressure being derived from the process stream itself, with the main line tapped at some point up-stream of the valve inlet. The unit is opened by releasing this pressure, allowing the line pressure to lift open the diaphragm and disc. Small, three-way pilot valves which can be manually or automatically activated are used to apply or release pressure in the control tube.

Because the diaphragm of the valve is in constant contact with the process stream, a limiting factor has been temperature of the liquid handled. Until now it has been restricted to 180 deg. F. But the development of a temperature resistant elastic material for the diaphragm has changed this, and the valve may be used at temperatures over the boiling point of water.

Uses vary from water softeners, filters, boiler-feed units, etc., to waste-water disposal systems. Units range in size from ⅛-in. to 16-in., with screwed or flanged connections.

Cost-cutting ways found to produce steel load arms

SPECIAL STEEL LOAD ARMS are now being manufactured for Hyster lift trucks by Bethlehem Pacific's Seattle steel plant.

case study 82

Previously, the Hyster Co. had depended upon special alloy steel produced at Eastern mills. Now, the less costly steel from Seattle, combined with reduced freight costs, has resulted in substantial savings in producing the load arms.

Hyster and Bethlehem Pacific cooperated closely to develop a bar section that could be produced at the Seattle plant and at the same time perform the terrific lifting jobs required of Hyster trucks.

The special bars are being rolled in three sizes: 2½x6 in., 3x6 in. and 3x8 in. From these steel sections the load arms are fabri-

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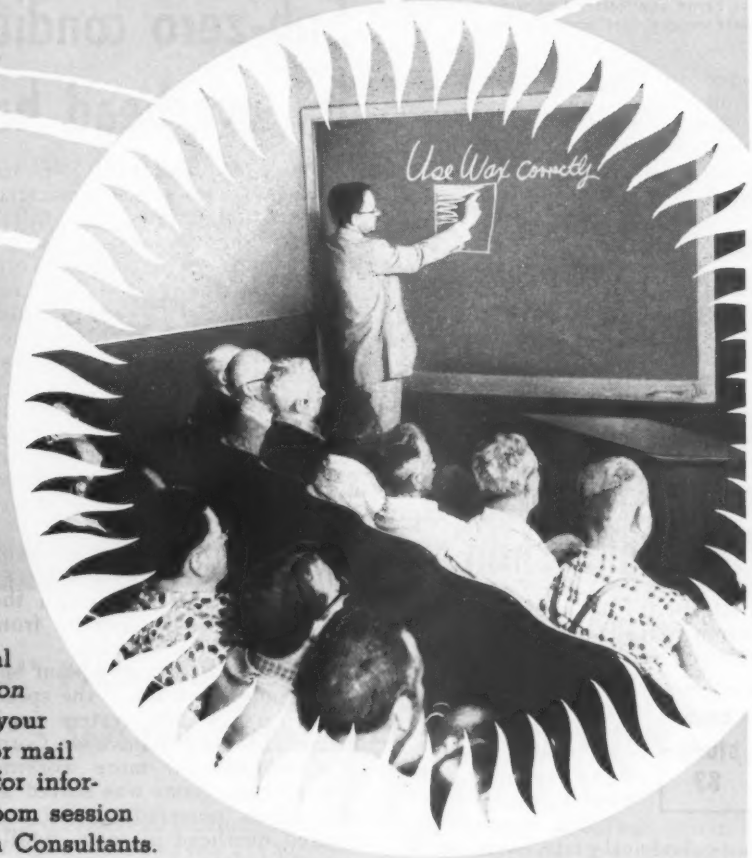

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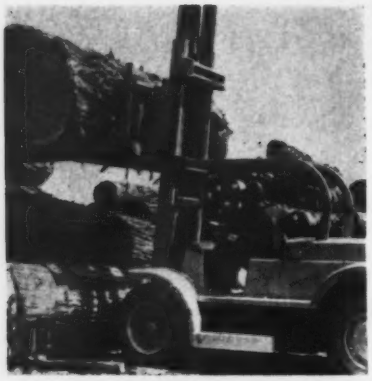


Hyster—cooperating with Bethlehem Pacific—has found new cost-cutting ways to produce these rugged steel loading arms.

cated in Hyster's big Portland plant.

A bar is flame-cut in a diagonal fashion to form two separate arms, both of them tapered. These are welded to shanks, also cut from Seattle plant bars, to form the elbow of the arm.

The uprights on which the load arms are raised and lowered are also made from steel manufactured in Bethlehem Pacific's Seattle steel plant.

Cylindrical grate protects foodstuff from tramp iron

PROTECTING MILL from tramp iron damage is 100% successful since Fudge Mills, Inc., Heber, Calif., installed a permanent magnetic cylindrical grate in a drop chute supplying dehydrated alfalfa meal to a pellet mill.

case study 83

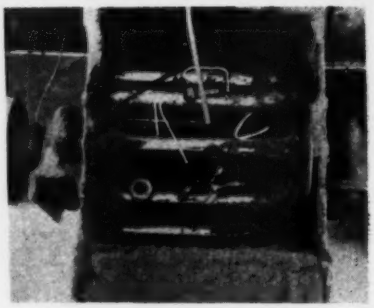
"Before installing our cylindrical grate," writes **R. M. Fudge,** manager of Fudge Mills, "we were breaking our pellet dies at approximately one-fourth of their potential life. As these dies cost us from $350 to $800 each, the loss was considerable — conservatively $1200 a year.

"Since installing the Rota-Grate unit we have had no fractured dies from tramp iron whatever, and are so impressed by its performance that we have taken every opportunity to recommend similar installations to others in our field."

A product of Eriez Manufacturing Company, Erie, Pa., the Rota-Grate is, essentially, a cylindrical grate composed of multiple stainless steel Alnico V tube magnets mounted horizontally between stainless steel end plates.

Placed in open enclosed ducts or chutes, the assembly is mechanically rotated through the flow of material, thereby effectively exposing every part of the moving stream to the powerful magnetic field surrounding each tube. Accumulations of tramp iron or fine ferrous particles are periodically removed by simply wiping the tubes clean.

Notice the tramp iron clinging to this Eriez magnetic cylindrical grate. It proves that it successfully traps falling parts.



Sub-zero conditions? It's fine for overhead handling system

SUB-ZERO CONDITIONS are not the best for efficient material handling. And it was a critical consideration when the Triangle Cold Storage Co., Los Angeles, converted from bulk packaging of shrimp to individual quick-freezing.

case study 84

The seafood processor faced the problem of transporting shrimp through cleaning, freezing, glazing and packaging — without expanding present building or refrigeration facilities.

The solution was a versatile overhead conveyor that moves loads continuously through the entire processing sequence from cleaning to final packing.

Harry Oda, Triangle plant superintendent, set down the specifications for the system engineered by the Chainveyor Corp. The demand for more working and storage room was solved as the 400-ft. powered system was routed overhead in space totally unused before.

After the shrimp are prepared for freezing, they are loaded on carriers accommodating four trays each. The carriers, spaced 18 in. apart, proceed into the freezing room through a small wall opening.

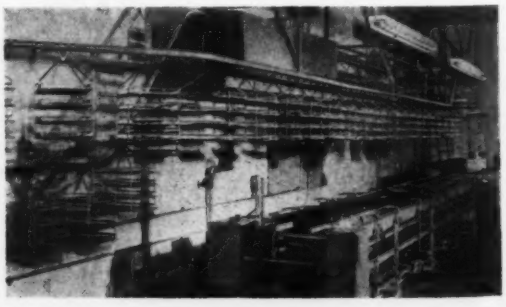
In the freezing compartment, Chainveyor's 16-in. radius turns make possible parallel lines only 32 in. apart. This space-saving feature permits four passes through the compartment and provides approximately an hour of freezing time at 20 deg.

After freezing, the trays enter another cold room where they are dipped into tanks for glazing of the shrimp, then returned to the normal air temperature of the cleaning-packing room. Despite the extremely humid atmosphere and resulting condensation, there is no adverse effect on the conveyor equipment.

In the bulk handling method previously used, two or three men were required for loading and unloading in the freezing and glazing processes. Refrigeration was also dissipated by frequent movement in and out of the refrigerated rooms.

Considerable savings in refrigeration cost are now effected by Chainveyor's uninterrupted movement from room to room through small wall apertures.

Uninterrupted movement—in and out of sub-zero freezing room—is possible with this Chainveyor system at Triangle Cold Storage Co.



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Lo-X Bus Duct assures lower balanced voltage drop . . . extra current carrying capacity

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BullDog Elec. Prod. Co. of Los Angeles
2885 E. Washington Blvd.
Los Angeles 23, California

Tape-controlled spot welding helps produce problem parts

case study 85

TAPE-CONTROLLED SPOT WELDING is helping Convair (Pomona) Division of General Dynamics Corp. to produce problem parts for surface to air guided missiles.

Design technicalities meant ordinary spot welding techniques couldn't be used . . . since resistance welding would require that both sides of a joint be accessible. But Heliarc spot welds are produced when a tungsten electric arc, shielded by inert gas, is applied to only one side of a joint. Since heat from the torch melts the metal through the joints, the second side of the joint need not be accessible, making it ideal for joining parts in which two or more surfaces must be welded to a core.

When it seemed the process would be adaptable to semi-automatic production programming, Convair contracted with the Linde Co. to design and construct a tape-controlled programmer and welding machine that would produce up to four identical parts at one time. The basic welding machine has four torches. Hydraulic controls position the torches horizontally and they are raised and lowered pneumatically.

When operated by a tape program control unit (the machine may also be worked manually), pre-determined location and condition data for each weld are punched onto the tape by a Flexowriter. The tape is then fed into the control system, which converts the data into command information for the machine. Torches are positioned, and work tilted to the proper angle. And the correct time and current for the weld are selected automatically.

The nature of the product and its markets determines the questions to be answered, of course. A new or improved material could possess all the advantages of new uses, improved performance and lower price; tooling equipment would almost certainly be judged by its economy for the buyer, in relation to cost. Availability in a regional market may be an important asset to Western manufacturers, and so can freight advantages. The physical characteristics of the West call for different types of equipment in many cases, such as longer trailers and heavier construction machinery, which gives Western firms a chance to build special machines.

Skillful use of fork lift trucks adds up to manpower savings

case study 86

ECONOMICAL USE OF MANPOWER is resulting from the skillful use of fork lift trucks at a Sacramento, Calif., lumber firm.

Setzer Forest Products Co. is using two trucks for moving lumber and finished products through its main yard, and it is estimated that together they handle 750,000 board-feet of lumber a week.

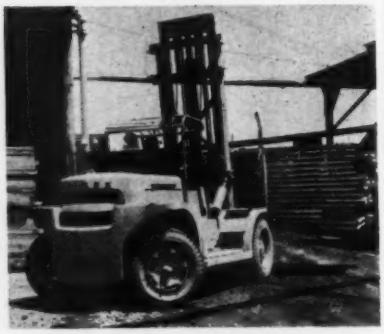
The fork trucks are in constant use moving lumber from the sawmill to the green yard and dry kilns in tiers about 21 ft. high. From the green yard the trucks shuttle lumber to the sorting chain where it is manually graded and restacked.

Then the fork trucks take over again and move the lumber to the dry kiln or to the box factory. Lumber can be tiered up to 21 ft. in the kiln where its moisture content is reduced 16%.

The trucks are also proving useful in shuttling 2-ton stacks of Presto-logs from the building in which they are made from sawdust, to a storage shed and from there to trucks for shipment.

Only modifications made to the trucks, manufactured by Clark Equipment Co., is the installation of tractor-type filters to prevent dust from being sucked into vital working parts of the engine.

750,000 board-feet of lumber is moved each week by a skillful combination of Clark fork lift and right manpower.



Automatic machine speeds food tying by as much as 50%

case study 87

AN AUTOMATIC TYING machine speeded the tying of boneless whole turkey by 50% at the Christoffersen Poultry, Egg and Feed Market in Turlock, Calif.

More than 300 turkeys per day are processed, tied and packaged at the Christoffersen plant under the Valchris label. According to **Tony J. Volk,** manager of the Valchris plant, the installation of the twine tying machine so speeded the packaging part of the operation that one man easily

One man easily keeps up with 12 "boners" in this turkey processing plant—thanks to a Bunn automatic tying machine.

keeps up with 12 women "boners."

At one end of the boning table the tying machine, manufactured by the B. H. Bunn Co., Chicago, is installed. As each turkey is boned and tied, it is slid down to the end of the table near the machine. The operator takes each one, and in about 20 sec. completes four separate ties around it to make a neat package.

He simply places the turkey on the waist-high tying table, trips a foot pedal, and the tying arm makes a circle around the bird. At the completion of the circle. the machine's knotter engages the twine, twists it deftly into a neat double loop knot and cuts it to complete the cycle.

The operator moves the turkey forward a couple of inches and repeats the process. He does this a total of four times and the carcass is ready for packaging.

In addition to speeding up the operation, the Bunn machine tying helps to restore the bird to its former shape. This improves its appearance and makes it more attractive to the prospective buyer.

Savings in labor pays for labeler in just one year

SAVINGS IN LABOR costs pays for this machine in one year. That's the good news at the Rolley Co., manufacturers of Sea & Ski lotion, at its plant in South San Francisco.

case study 88

The company recently installed an automatic label applicator to apply pressure-sensitive contact labels to bottles of lotion. This was formerly a costly hand operation.

But now with a new machine the bottles are carried through the applicator where a label is dispensed and applied automatically. Some of the salient features of this machine, supplied by the Archer Label Co., Los Angeles, are:

1. One operator feeding and one operator taking off and cartoning does the same work it formerly required five operators to do.

2. Top speed of machine is 80 per min. Average production in

It's simple and it's fast . . . and this Archer automatic labeling machine has paid for itself in just one year.

eight-hour shift is 16,000, running at approximately 40 per min.

3. Changing rolls takes only 3 min.

4. A conveyor was built into the applicator so the machine could be used as a continuation of several different lines with the adjustable height feature.

Danger! Lint speck can be as deadly as an enemy missile

AS DANGEROUS AS THE MISSILES and bullets of an enemy plant. That's what a speck of lint can be — in it's own way — to our fighter aircraft.

case study 89

At the Torrance facility of Douglas Aircraft Company's El Segundo (Calif.) Division, the problem of lint has been met and solved satisfactorily by the men who manufacture the Douglas F4D-1 "Skyray," high-altitude supersonic interceptor used by the Navy and Marine Corps.

Workers in the Douglas Plastics Department are using lint free disposable paper wipers to wipe excess bonding agent from a partially completed Plexiglass cockpit enclosure for the "Skyray."

Lint left by wiping materials in this important operation would have caused costly rejections. When the plastic enclosures are hardened and finished, the lint residue would appear as specks, making distortions which would mar the view of the pilot.

Before picking the paper wipers, Douglas made a controlled study of different wiping materials, including shop towels, rags, and paper wipers. It was found that the Scott paper wipers most effectively met the exacting demands for economical and lint-free wiping.

Their patented two-ply "Perf-embossed" surfaces absorb the bonding agent and other substances without leaving fuzzy deposits.

Unorthodox means used to lick machining problem

UNORTHODOX METHODS were used by tooling and carbide engineers of Otis Engineering Co. to successfully machine a 17-4-PH stainless-steel sliding door closing sleeve.

case study 90

Negative rake angles are used on the turning tools instead of positive rakes; soluble oil is used instead of sulpho-chlorinated active sulphur-based coolants, and cutting speeds three times those normally recommended are successfully used for both rough and finish-turning.

Turning is done with a single, relatively small throw-away-insert type toolholder, having a 45-deg. lead angle, primarily designed for chamfering operations.

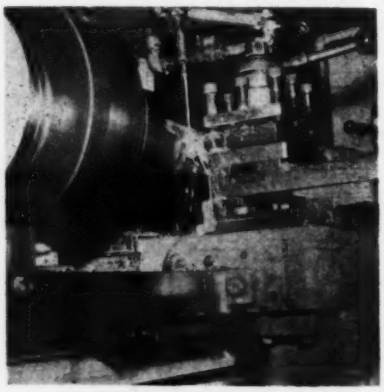
Stumbling blocks that forced this unusual approach to a stainless turning job—being done on a 16-in. Lodge & Shipley, 20-hp. tracer lathe—include extreme cutting pressures, intense heat at the tool-chip interface, abrasive edge wear and cratering caused by the high-tensile extremely hard (32-39 Rc) steel, and chip breaking or control problems.

In spite of the fact that excessive carbide wear and cratering indicated the need for a sulphur-based oil coolant, Otis engineers successfully attacked the heat problem by applying a soluble coolant, having a mixing ratio of 20:1, so that it floods the cutting edge.

Next, a series of machine ability tests, in which engineers of the Wesson Company assisted, were run with a standard negative-rake throw-away-insert toolholder. As a result of these tests, Wessonmetal-26 carbide, having high red hardness, wear and crater resistance, and compressive strength, was specified for the job and results in 5 times the tool life. The combination of soluble-oil coolant and this particular grade of carbide drastically reduce cratering and avoid the carbide pressure cracks that developed in all other inserts and grades tried.

Using the standard holder and Wessonmetal-26, engineers started increasing speeds and feeds until an optimum life of 80 sleeves per insert was achieved at 600 fpm. and a feed of 0.012 in. per revolution. Depths of cut of 7/32 in. from the rough and 1/32 in. for finishing are unchanged.

Here, soluble oil (Wesson) is used instead of sulpho-chlorinated active sulphur-based coolants, and cutting speeds upped three times.



Handy gouging torch removes steel slag at half the cost

SPEEDY REMOVAL of half an inch of manganese steel on railroad crossover members is accomplished right on the spot with the use of a versatile gouging torch. After being installed, crossover members were found to be too high for free passage of wheel rims, and removal of excess steel was the only remedy.

case study 91

The job was done at half the cost of grinding, and without discontinuing operations, which removal of the track would have necessitated.

Arcair torch, made by the Arcair Co. of Lancaster, Ohio, directs a stream of compressed air parallel to the electrode. The air blast not only quickly removes the molten metal, but cools the parent material at the same time.

You can save 80% by putting all eggs in one basket

"PUT ALL YOUR EGGS IN ONE BASKET" is the advice North American Aviation gives . . . and by doing so you can reduce the cost of loading and packing parts by as much as 80%.

study case 92

The "egg baskets" are large plywood boxes, which are technically called MUEC's (Multiple Unit Exterior Container). Instead of packaging airplane parts individually by item, the Division's Shipping Department now packs many items in one big box.

Where individual packing would have taken twenty and one-half hours and individual boxes would have cost about $69, MUEC packing takes four hours and the single, big box costs about $21.

Like most developments, this many-in-one-box technique looks like the most obvious thing to do —after the fact. The man who saw the obvious beforehand in this case was **Ted Evans,** General Foreman of the Division's Shipping Department.

The MUEC box was designed by the Division's Packaging Engineering Section and approved by the Air Force Sacramento Air Materiel Area.

An earlier North American development, the Klimp fastener, is used to assemble the boxes. This fastener replaces nails; permits easy removal of box sides without damaging them. Thus, instead of loading over the 4-foot high sides of the MUEC boxes, walk-in loading is possible.

Also, the boxes can be shipped back flat from the Air Force for further savings through re-use.

For example, so many boxes can be shipped back flat on an average truck that freight costs work out to only $1.33 to re-use a box which costs $21 new.

North American and many other firms, Evans points out, have been using boxes secured with Klimp fasteners for several years. The MUEC technique adds new savings in shipping parts orders of varying sizes to the economies gained from using these fasteners instead of nails.

Costly sheet metal damage cut with new method of racking

case study 93

A NEW METHOD OF RACKING has solved the problem of damage to expensive sheet metal at the Denver branch of Metal Goods Corp.

Under the old system, aluminum and steel sheets of varying sizes, up to ten ft. by four ft., arrived at the Denver warehouse on skids and were stacked horizontally on the floor, one on top of the other.

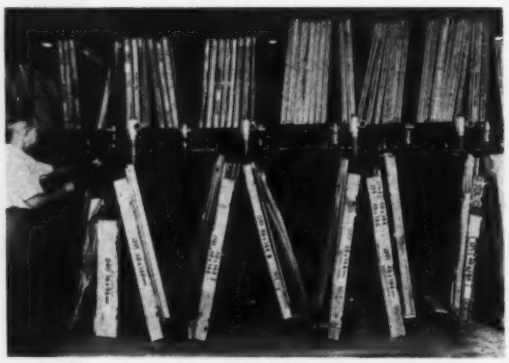
In order to reach and select a given size and gage sheet it very often was necessary to lift the material stacked on top of the desired item with an overhead crane and set it in the aisle.

In this double handling process, edges of sheets were too frequently damaged. These defective sheets were being accumulated in Metal Goods warehouses at the rate of $12,000 per year.

John Jansen of Metal Goods Corporation's main office in St. Louis designed a pyramid type rack, utilizing standard I.P.S. pipe and Hollaender Nu-Rail structural fittings to permit fast assembly and flexible racking arrangements.

In this type of rack the skids of metal sheets are stored vertically instead of horizontally so that each skid or, for that matter, each individual sheet can be removed from the rack without damaging or disturbing any other material.

As a result of the savings effected through the elimination of damaged goods, these racks returned their cost in less than one year's time. In addition, the materials used for the racks, pipe and fittings, are completely salvageable since no threading or welding is necessary. Fittings slip on and are tightened with a hex wrench. They are as easily removed, making it possible to redesign the racking arrangement or expand it, quickly and inexpensively, to suit changing needs.



See how neatly and securely these expensive sheet metal parts fit into this rack made from standard I.P.S. pipe and Hollaender Nu-Rail structural fittings.

One man can control cement operations by closed circuit TV

case study 94

ONE MAN CAN CONTROL the reclaim, secondary crushing and distribution of cement rock at the Lone Star Cement Co. at Seattle? Yes. And it's not as difficult as it seems. You see, a closed circuit television system is coupled with a remote controlled conveyor system ... and by this means one man can easily control many operations.

The conveyor system at this plant consists of two reciprocating feeders, four belt conveyors and a self-propelled tripper. This system transports cement rock from storage pile to secondary crusher and to storage bins adjacent to the ball mills.

Reclaim of cement rock is accomplished by two reciprocating feeders mounted in a tunnel underneath the stockpile. A 30-in. wide tunnel belt conveyor, equipped with 45-degree toughing idlers, receives material from these feeders. Each feeder has a capacity of 150 t.p.h. and is mounted under a 2-ft. square opening in the tunnel. One or both of these feeders, mounted 48 ft. apart, may be used to feed reclaimed material to the tunnel belt.

By means of a 90-degree transfer chute, the tunnel belt discharges to an inclined 30-in. belt conveyor which conveys the cement rock to the 4½-ft. cone crusher. Discharge from the crusher is handled by a 24-in. wide inclined belt which feeds through a 90-degree transfer to another 24-in. belt equipped with a self-propelled tripper. The traveling tripper can be positioned to feed secondary crushed lime rock to any of four storage bins, where it is later reclaimed and sent to ball mills.

An industrial closed-circuit television hook-up monitors the storage bin area. This system was installed because the operator, at the crushing and conveying control panel in the secondary crusher building, could not otherwise see the tripper and storage bins.

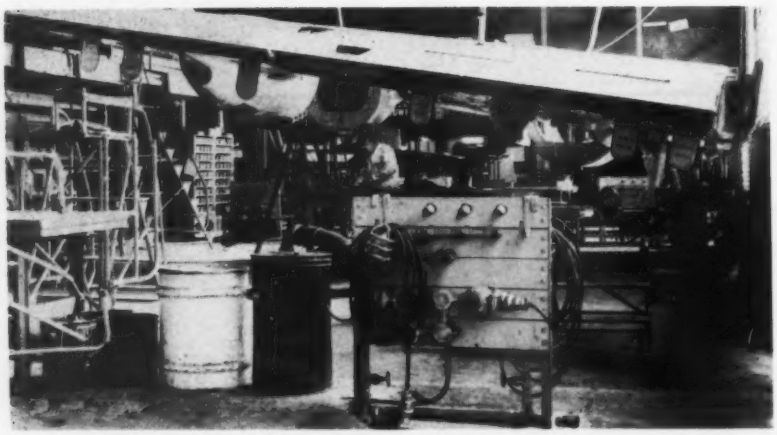
A television camera, mounted so that it looks down on the tripper and storage bins, transmits a picture of this area to a receiver near the control panel. The operator, by watching the screen, can check the progress of bin filling

By watching the television receiver, the operator at the control panel in the secondary crusher building can monitor the positioning of the belt conveyor tripper. Mimic belts on the control panel simplify operation of the conveying and crushing system.

operations and see how to position the tripper.

Link-Belt Co.'s Seattle plant furnished and installed all of the conveying equipment and designed the structural galleries and crusher building for this installation.

New curing, sealing operations convert plane wings into tanks



These wings are now tanks—thanks to the new process which permits complete sealing with liquid polymer. Two Clayton controlled circulation type steam generators have important roles in this process.

A "FIRST" in curing and applying in place a liquid sealant for complete sealing of horizontally planed wing sections has been claimed by Lockheed Aircraft Corp.

case study 95

Lockheed Connies and Electras utilize the whole wing section as a tank . . . the usual individually fabricated rubber lined tanks are not used. The wing—the outboard, inboard and center sections—is now a fuel tank, sealed tight to prevent fuel leakage.

These wings are not sealed with thick blankets of pure or synthetic rubber as in the older method of sealing individual wing tanks. A more efficient and dependable lightweight product is a liquid polymer product, processed and cured as it is applied to seal the wings.

The whole sealing process is not performed in one step, or in one operation, but is accomplished step by step after structural assembly and during the wing's final progress through various stations of the Tank Seal Building's assembly line.

Although the application and use of different polymers is common in other applications at Lockheed, this particular tank-seal facility and the application itself is different.

In the assembly areas as the wings move along, with sub-assemblies and individual parts being moved in from other buildings, the wing is progressively and finally assembled in a procedure that provides a faying sealing operation at practically every phase. When "skins" (in reality they are planed slabs of 7075 aluminum plate) are placed in the jigs for fastening to ribs, bulkheads, etc., the polymer sealant is applied on all necessary surfaces, seams and joins, by means of brush or filleting gun. Immediately after this application the assemblies are joined. When the assemblies are complete they are shipped to the Tank Seal Facility.

Upon arrival in the tank seal department they are prepared for primary processing, or sealing, by "hand washing" every bit of the wing interior with a chemical that cuts and cleans away contaminating materials. The chemicals' residues are carried off by hot evaporation.

The cutter or cleaner chemical compound is a blend of cleaning solvents capable of film-free drying. Following wash, the wing is sealed in successive steps. The sealant is cured, following each step, by passing heated air over the surfaces, using six-in. flexible metal tubing which is inserted into a wing opening nearest that point.

The cure is that of a chemical reaction rather than evaporation —heating simply accelerates it under controlled conditions.

Flexible tubes are used in the curing process to conduct 120 deg. F. air from ducts located under the floor of the building. There are approximately 2,000 ft. of these ducts under the assembly floor delivering heated air to almost any part of the assembly line occupying approximately 28,-000 sq. ft.

Producing clean, filtered air which must arrive at the usage point in "inexhaustible volume" at a constant 120 deg. F.—140 deg. F. is a critical part of the whole process of applying and curing the polymer sealant. Lockheed production engineers developed a system, which although appearing quite complicated, is in reality quite simple.

A critical factor upon which the whole system must depend is the source and temperature of the hot air. Without heat in the right amounts and at the right temperature, the whole sealing process and wing assembly line breaks down and since each step by step application is controlled by both time and temperature . . . if a step misses an adequate cure, the whole assembly line stops.

To heat the clean filtered air, steam at 150 psi, is produced by two Clayton Mfg. Co. steam generators which arrives at a transfer coil 150 yards away at about 45 psi where air is pulled through and heated before delivery to the underground system of the assembly building.

When leaving the coil, the air is 175°F. to assure delivery at the usage point of 120°F. minimum and 140°F. maximum. Approximately 35 degrees of temperature are lost during transmission to the sealing building. Enough heated air is produced to permit heating the building, too, through overhead connecting units.

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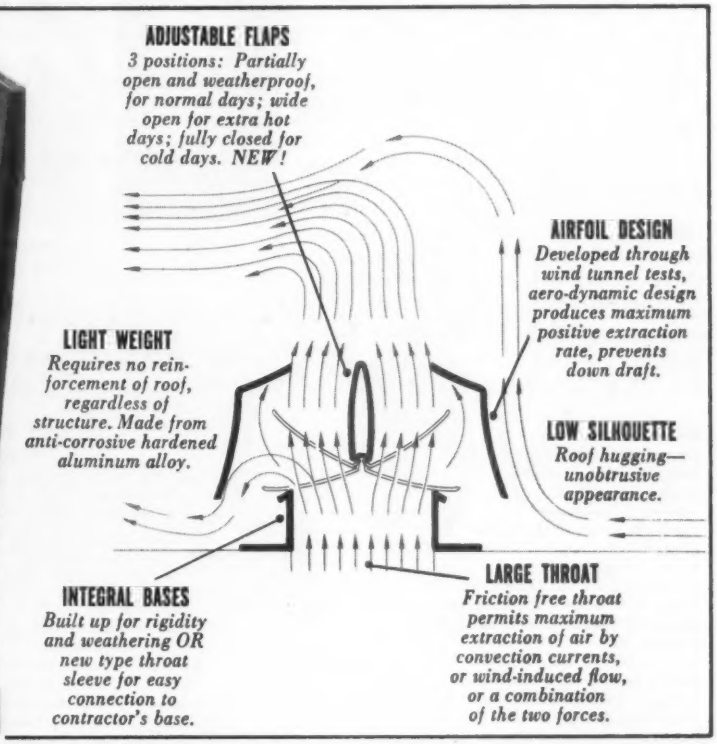

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The show will stress current and future trends of missiles, rockets and related support equipment. Over 500 exhibits and displays will show you what is being done—and what can be done—in this Space Age.

A partial list of firms exhibiting appears below, and the agenda for the program appears at right.

Acoustica Associates, Inc.
Adams Rite Manufacturing Co.
Adel Precision Products
Aerojet-General
Aerolab Development Co.
Aeroquip Corp., Western Div.
Aircraft Bolt Corp.
Air Reduction Pacific Co.
Allied Research & Engineering Div.
Allied Record Manufacturing Co.
Allend'Or Productions/Spotlite News
Anadite, Inc.
Arizona Gear & Mfg. Co.
Armite Laboratories
Automation Electronics, Inc.
Avco Mfg. Corp.
B J Electronics, Borg-Warner Corp.
Beach Sta-Dri Filter Co.
Bekins Van & Storage Co.
Blair-Martin Co., Inc.
Bray Oil Co.
The Budd Co.
Cable Distributors, Inc.
California Industrial Purchasing Guide
Camloc Fastener Corp.
Cannon Electric
Carbide Products Co.
Chem-Tronics, Inc.
Coast Pro-Seal & Mfg. Co.
G. L. Collins Corp.
Columbia-Geneva Steel Div.
United States Steel Corp.
Consolidated Controls Corp.
Continental Sales & Service Co.
Convair
Deutsch Fastener Corp.
Dolliver & Brother
Douglas Aircraft Corp.
Dressen-Barnes Corp.
Ducommun Metals & Supply Co.
Electric Steel Foundry Co.
Electronics Sealing, Inc.
Encyclopedia Americana
Encyclopaedia Brittanica
Emery Air Freight Corp.
Fabriform Metal Products
Fluorocarbon Co.
Fornaciari Co.
Fruehauf Trailer Co.
Garrett Corp.
Gebe Electronic Services, Inc.
General Logistics

Hugh L. Dryden

R. Adm. William Francis Raborn, Jr.

Lt. Gen. Arthur G. Trudeau

Maj. Gen. William T. Thurman

Agenda

1959 WESTERN SPACE AGE CONFERENCE AND EXHIBIT
March 5-6-7, 1959

Thursday, March 5

Morning Session

9:00 Opening address
"America's Challenge"
A comparative analysis of the United States' program and Russia's—a discussion of what we must do and why
Erik Bergaust, Editor, Missiles and Rockets Magazine

9:30 to 11:30 Panel discussion
"The Changing Role of the Relationship Between the Prime Contractor and the Sub-Contractor"
A comprehensive discussion of the factors affecting the changing pattern of procurement practices
Moderator: **Rulon Nageley,** Director of Materiel
North American Aviation, Inc.
Panelists: **F. L. Dobbins,** Director of Materiel
Boeing Airplane Company
H. G. Golem, Director of Procurement
Convair, a Division of General Dynamics Corp.
John Marschalk, Executive Director
Strategic Industries Association
Barry Shillito, Director of Sales
Airborne Systems Group
Hughes Aircraft Company

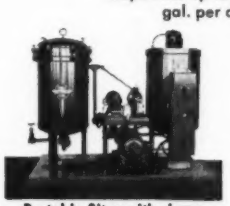
Noon Session

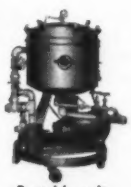
12:00 Luncheon served
12:45 Introductions
1:00 Keynote Remarks
Courtlandt S. Gross, President, Lockheed Aircraft Corporation
1:30 "Exploring the New Frontiers of Space"
Dr. Hugh L. Dryden, Deputy Administrator
National Aeronautics and Space Administration

Afternoon Session

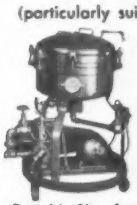
2:30 to 4:40 "Army Research and Development Policies"
A thorough discussion of opportunities and requirements in the research and development program of the United States Army
Lieutenant General Arthur G. Trudeau, USA
Chief of Research and Development
Department of the Army
T. F. Morrow, Group Vice President
Defense and Special Production Division
Chrysler Corporation
Brigadier General Earle F. Cook, USA
Chief, Research and Development Division
Office of the Chief Signal Officer
Department of the Army
Brigadier General John G. Shinkle, USA
Commanding General
Army Rocket & Guided Missile Agency
Department of the Army

(Continued on p. 66)


Portable filter with slurry tank and feeder.


Portable unit, explosion proof.


Portable unit corrosion proofed, rubber lined with plastic plates.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Western Space Age Conference *(starts on p. 64)*

General Plastics Corp.
Genisco, Inc.
Gladding, McBean & Co.
Great Books of the Western World
Greer Products, Inc.
Grolier Society, Inc.
Hamer Valves, Inc.
Harvey Aluminum
Hermetic Pacific Corp.
The Hesick Co., Inc.
Hollywood Plastic Arts, Inc.
Industrial Market Research Associates
Instrumentation Sales
Lawatch Ltd.
Leach Corp.
Lefiell Mfg. Co.
Lockheed Aircraft Corp.
Los Angeles Lithograph Co., Inc.
Smalley, Levitt & Smith
for Lyon Aircraft Services
Lytle Engineering & Mfg. Co.
Edward D. Maltby Co.
Manufacturers Service, Inc.
Marquardt Aircraft Co.
Marshall Tool & Supply Corp.
The Martin Co.
Master Specialties Co.
Menasco Mfg. Co.
Mesa Plastics Co.
Mill Polishing Corp.
Modern Plating Co.
Monogram Precision Industries, Inc.
Moriarty & Zahner
Narmco Manufacturing Co.
National Screw & Mfg. Co. of Calif.
Norris Thermador Corp.
North American Aviation, Inc.
Northrop Aircraft, Inc.
Northrop Div.
Packard-Bell Electronics
Perkin Engineering Corp.
Perry-Kilsby, Inc.
Piddington & Associates Ltd.
Product Techniques, Inc.
Purolator Products, Inc.
Quality Control Co.
Raytheon Mfg.
Research & Education Corp.
Robbins Aviation, Inc.
Rome Cable Corp.
Roylyn Airaterra
Salsbury Corp.
Seaton-Wilson Mfg. Co.
Sharpe Heating & Ventilating, Inc.
Sheridan-Gray, Inc.
Sierra Engineering Co.
Skurka-Langdon Engineering Co.
Solartron, Inc.
Southern Nevada Industrial
Foundation, Inc.
Spar-Tan Engineering Corp.
Standard Wire & Cable Co.
Stone & Smith, Inc.
Summers Gyroscope
Superweld Corp.
Charles W. Thrift Co.
Timech Corp.
Transicold Corp.
Turco Products, Inc.
Ultra-Violet Products, Inc.
Vacuum Plate Corp.
Vendorlator Mfg. Co.
Warrington Bros. Mfg. Co.
Wesrep Corp.
Westinghouse Electric Corp.
Weston Hydraulics Ltd.
Sub. Borg-Warner Corp.
Wharton Unitools
Wiancko Engineering Co.
E. B. Wiggins Oil Tool Co., Inc.
X-Ray Services, Inc.
Zep Aero

Evening Session

Chairman: **James H. Doolittle**
Lieutenant General, USAF (Ret.)
Chairman of the Board, Space Technology Laboratories, Inc.

6:30 Dinner served

7:15 Welcome
J. E. Fishburn, Jr., President, Los Angeles Chamber of Commerce

7:25 "The X-15 Flight Test Program"
Scott Crossfield, Experimental Test Pilot and Design Specialist
North American Aviation, Inc.

7:35 Subject to be announced
Major General B. A. Schriever, USAF
Commander, Ballistic Missile Division
Air Research and Development Command

Friday, March 6

Morning Session

9:30 to 11:30 "Markets for the New Generation of Manned Air and Space Vehicles"
A review of some of the new developments in manned air and space craft, their future uses, and their significance as a marketing potential in the industry.

"Vertical Flight Aircraft"
Captain Sydney Sherby, USN (Ret.)
Vice President of Engineering and Research
Hiller Aircraft Corporation

Jack J. Jones, B-70 Weapons System Manager, Los Angeles Division
North American Aviation, Inc.
"Nuclear Aircraft"
Speaker to be announced

"Manned Space Vehicles—Re-entry Problems"
Edward Z. Gray, Systems Engineering Director
Systems Management Office
Boeing Airplane Company

Noon Session

12:00 Luncheon served

12:45 Introductions

1:00 "The Fleet Ballistic Missile Weapons System—A Program for Production Planning and Control"
Rear Admiral W. F. Raborn, USN
Director, Special Projects
Bureau of Ordnance
Department of the Navy

Afternoon Session

2:30 to 4:30 "The Team Concept and Air Force Systems Management"
Major General William T. Thurman, USAF
Assistant for Production Programs
Department of the Air Force
Dr. Simon Ramo, Executive Vice President
Thompson-Ramo-Wooldridge Corp.

2:30 to 4:30 "Trends in Materials"
Moderator: **Alan Levy,** Supervisor
Materials and Processing
Marquardt Aircraft Co.
Panelists: To be announced

"The New Look in Steel Casting"
Walter Dunn, Vice President
Pacific Alloy Engineering Company

Saturday, March 7

12:00 noon A special meeting of approximately 2,000 carefully selected high school students interested in science and engineering

Welcome: **Mr. Courtlandt S. Gross,** President
Lockheed Aircraft Corporation

Featured Speaker: **Dr. Edward Teller,** Director
University of California Radiation Laboratory

Subject: "What Can and Cannot Be Done in Space Travel"

Host sponsor for the 1959 meeting is the Industrial Market Development Committee of the Los Angeles Chamber of Commerce. Eight other major chambers of commerce from throughout the West are co-sponsoring. Chairman of the event is **Courtlandt S. Gross,** Lockheed Aircraft Corp.

Further information may be obtained from the Los Angeles Chamber of Commerce, 404 S. Bixel St., Los Angeles. Phone HUntley 2-4010.

—Best manuals on industrial chemicals—

Yours for the asking . . . use postcard, p. 69

Technical data on liquid nitrogen

Properties, safety considerations, design factors and thermodynamic data are section headings in this comprehensive 20-pager about liquid nitrogen. Schematic drawings and detailed tables are used with the text to supply helpful information. Complete run-down on properties of superheated nitrogen vapor is given in the tables on pages 16-17. **Linde Co., Division of Union Carbide Corp.**

. . . for your copy, circle No. 175

Chloride metallurgy and what it means

The complete story on chloride metallurgy is well told in the 35 pages of this heavily illustrated presentation. It contains detailed data on aluminum chloride, antimony trichloride and pentachloride, boron trichloride, silicon tetrachloride, titanium tetrachloride and zirconium tetrachloride, including uses, properties, specifications, analysis and other facts. **Stauffer Chemical Co. . . . for your copy, circle No. 176**

20-page manual on L-P Gas equipment

If you're dealing with L-P gas, you'll find much helpful information in this 20-page manual describing carburetion equipment for many uses. It features labelled cutaways and drawings of conversion equipment of various types, carburetors, adapter-mixers, filters, exchangers and other products and accessories. Amusing sketches brighten up the list of nine money-saving advantages of L-P Gas. **American Liquid Gas Corp. . . . for your copy, circle No. 177**

Facts on gases used for food products

Gases play an important role in food processing, preserving and packaging . . . as you'll find by reading this 24-page handbook. Sections deal with the important jobs gases are doing for the food industry. . . What a gas can do (blanketing, pressure packing, quick freezing, chemical processing). . . Background on sources and properties of gases. . . Choosing a gas—factors to consider . . . delivery, storage and handling . . . supply sources. Charts and drawings help illustrate points. **Air Reduction Co., Inc.**

. . . for your copy, circle No. 178

56-page volume gives you the caustic soda story

A real addition to your chemical library, this 56-page hard-cover book about caustic soda is organized for easy reference and divided into 11 sections including an index to the figures and tables generously sprinkled throughout. Physical properties of anhydrous caustic soda, uses, manufacture, safety, engineering and handling, and methods of analysis are some of the subjects covered. A four-page buyer's guide section contains many pictures, as does the rest of the book. **Hooker Chemical Corp.**

. . . for your copy, circle No. 179

The complete story on aluminum sulphate

Detailed drawings showing pump discharge and gravity discharge systems used with liquid aluminum sulphate are a feature of this book's section on storage and handling of the product. Other sections in the well-illustrated 32-page presentation cover major industrial uses, grades and packaging, physical properties, manufacture, analysis and technical service available. **General Chemical Division, Allied Chemical & Dye Corp. . . . for your copy, circle No. 180**

Western data sheets on Western chemicals

The Phosfacts File includes four data sheets that not only have a Western flavor in layout and text, but are also directed toward uses of chemicals in the West. The sheets cover the use of Ortho Phosphate . . . Pyro or Poly Phosphate . . . and Questex, plus practical ideas for use under Western plant operating conditions. Each chemical is thoroughly explained as to what it is composed of and how it can be used under Western conditions. Then a chemical properties table dissects each substance so you can see how it will work for you. And if you want more facts—they're yours for the asking from this firm. **A. R. Maas Chemical Co. . . . for your copy, circle No. 181**

The Victafile gives you a real package deal

This packet deal—called the Victafile—contains some 50 data sheets giving name, description, analysis, solubility, containers and use of some 80-odd chemicals. The three-part folder that holds the file has a chart listing 12 general industrial uses for the major products, plus a breakdown into categories such as formates and oxalates, photographic chemicals and phosphorous and phosphorous compounds, giving scores and scores of uses throughout industry. **Victor Chemical Works. . . . for your copy, circle No. 182**

10-page schedule for fine and industrial chemicals

Chemicals from A to Z—acetic acid to zinc sulfate—are listed in this 10-page price schedule that covers close to 200 fine and industrial chemical products, giving the prices for all. Definition of grades and other ordering information is included, as well as a list of some 30 purity chemicals for production use in industry. **J. T. Baker Chemical Co.**

. . . for your copy, circle No. 183

Two issues of Zircoa newsletter

First issue of the Zircoa News about zirconium oxide deals with refractories for high temperature alloys, covering refractory cost, metal quality applications and facts about new developments. A second issue reports on zirconium oxide refractory shapes, touching briefly on nuclear ceramics. **Zirconium Corp. of America.**

. . . for your copy, circle No. 184

Ahcoloid metal cleaners and their use

This four-page presentation is mainly a table that lists the various Ahcoloid metal cleaners and their uses, inluding data on operating conditions and pertinent remarks as to method, etc. Another page divides these alkaline materials into four categories depending on method of application. **Apothecaries Hall Division, The Hubbard-Hall Chemical Co. . . . for your copy, circle No. 185**

Four pages of facts on chemicals

Data on acids and anyhydrides, aldehydes, aromatic intermediates, solvents, alcohols, plasticizers and miscellaneous chemical products make up the table which covers two pages of this four-page booklet. Other information on cellulose products, seven interesting new chemicals, and an assortment of products such as additives, polyethylenes, etc. is included. **Eastman Chemical Products, Inc.**

. . . for your copy, circle No. 186

Here's help in solving your solvents problems

Typical inspections, shipping information, physical properties of the pure product and several paragraphs of general information for each of five solvents are given in the first section of this 20-page manual. The remainder is devoted to schematic drawings and charts dealing with effects on dilution ratios, dilution ratio vs. molecular rate, solubility, evaporation rates of common solvents and vapor pressure vs. temperature. **Enjay Company, Inc.**

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Tabular data on lithium products

Products and applications of lithium and lithium products are the subject of this four-page brochure that presents data in tabular form. Principal categories covered are lithium metal, lithium metal derivatives, lithium salts, and special lithium ceramic compounds (ceramic grade). Over 20 individual products are described in this manner. **Lithium Corporation of America, Inc.** . . . **for your copy, circle No. 188**

12 pages of data on Nicomo 1.

Nicomo 1.—a new hydrogen heating catalyst for hydrogenation, desulfurization, denitrification and contaminant removal—is thoroughly described in this booklet's dozen pages. Eight tables plus several charts make the data easy to analyze. **Davison Chemical Co., division of W. R. Grace & Co.** . . . **for your copy, circle No. 189**

Brand new booklet about argon

Just off the press in February, this 20-page, two-color booklet gives information on uses of argon (primarily nonwelding), methods of argon supply, and technical data such as purity, mixtures available and charts of physical properties. **Linde Co., Division of Union Carbide Corp.** . . . **for your copy, circle No. 190**

Selected technical data on sulphuric acid

Much of the material in this 36-page technical bulletin represents original work by General Chemical's research, production and engineering staffs and is not available elsewhere. Liberally illustrated with pictures, tables, drawings and figures, the manual deals with physical properties, safety, handling, analysis, and technical services offered by the firm. **General Chemical Division, Allied Chemical & Dye Corp.** . . . **for your copy, circle No 191**

Liquid helium for research near absolute zero

This four-pager explains how quantity production of liquid helium brings the entire field of low temperature research into the range of everyday investigation and use. And it shows how the phenomena which occur in the neighborhood of Absolute Zero can be exploited for industrial purposes. The brochure contains charts on physical properties of liquid helium and nitrogen and specifications for containers. **Air Reduction Co., Inc.** . . . **for your copy, circle No 192**

76 pages packed with vital chlorine information

Recommended equipment and methods for safe handling of chlorine illustrated with pictures and graphs is but one of 12 useful sections in this hard-cover book. Organized and indexed to speed your fact-finding, it covers physical properties, deals with chlorine manufacture and its uses, describes standard containers for shipping, etc. Five tables, 27 figures and a variety of pictures spice up the text. **Hooker Chemical Corp.** . . . **for your copy, circle No. 193**

Round-up of rare gases information

Pertinent facts on rare gases and mixtures are contained in this four-page brochure that includes charts for performance data, fluorescent color tubing and operating voltages for helium, neon, argon and krypton, plus several mixtures. **Linde Co., Division of Union Carbide Corp.** . . . **for your copy, circle No. 194**

Dehydration of air and gas with silica gel

Silica gel, a high capacity adsorbent and desiccant, is the subject of this technical bulletin that contains charts, graphs or tables on almost all of its 16 pages. Characteristics of this form of silica, fundamentals of adsorption and dehydration, and recovery of hydrocarbons from natural gas are some of the section headings. **Davison Chemical Co., division of W. R. Grace & Co.** . . . **for your copy, circle No. 195**

Improved argon gas supply with new cylinder

How added advantages of a new liquid cylinder mean added benefits to you, is detailed in this four page booklet. It describes a compact, portable source of argon which can mean new and diverse applications of the gas. Specifications and pictures help tell the story. **Air Reduction Co., Inc.** . . . **for your copy, circle No. 196**

LITERATURE FOR INDUSTRY

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32 pages on d-c contactors and relays

This manual includes general purpose contactors, mill-type contactors, time-delay contactors, general-purpose relays, timing relays, instantaneous-overload relays, field-loss relays, field accelerating and decelerating relays, and high drop-out relays. The book also provides extensive selection and application data, including ordering instructions, full product descriptions, photographs of representative units, and pertinent technical data. **General Electric Co.**

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Magnetic contact instruments and relays

Replacement of elaborate vacuum tube circuits with a small, rugged relay that will save space and eliminate stand-by power . . . that's what you'll find out about when you study this eight-page manual. Composite dimensional diagrams, photos, and descriptive copy spell out specifications. And that order information can put you on the right track to time and money saving. **Weston Electrical Instrument Corp.** **. . . for your copy, circle No. 198**

Illustrated booklet details worm gears

Why worm gears? Take a look at this eight page, picture packed information gem on worm gearing in general. It points up advantages and gives pertinent design and manufacturing facts. Smoothness . . . ruggedness . . . compactness . . . quietness . . . versatility . . . rigidity . . . utility and dependability are headings under which advantages of worm gear operations are listed. And look at the comparative size table on page 6—what could be simpler than that? **The Cleveland Worm & Gear Co.**

. . . for your copy, circle No. 199

P.I.V. variable speed drives, integral differential

This is the story of P.I.V. variable speed drives with integral differential. It's told in an illustrated 8-page publication that details everything . . . hp. ratings, dimensions, and selection data on four sizes of power transmission units. Generally, the drives are of two types: condensed speed range and extended speed range. The first permits extreme accuracy of control in a limited speed ratio range, generally less than 2 to 1. The extended speed range is used in cases where the required speed variation is beyond the range of a single or tandem drive. Available in four sizes (½, 1, 2, and 3 hp.) and three basic types (plain, with input gears, or motorized, with integral differential) they are designated: HDD—horizontal P.I.V. with differential; HGDD—with single reduction gearing on the input side (increasing or decreasing ratio; HMDD—motorized P.I.V. units. But send for the bulletin and read it at leisure. It's well worth it. **Link-Belt Co.** **. . . for your copy, circle No. 200**

Wiring diagrams for across-the-line starting switches

Diagrams never had it so good. Handsomely displayed in this 52-page guidebook, they show you some of the many ways that manual and magnetic across-the-line starters can be applied. The book also may be useful as an aid in teaching where simple wiring diagrams are to be studied. General types of applications include: fractional horsepower manual starters; manual starters; manual reversing starters; manual two speed starters; magnetic starters; magnetic reversing starters; multi-speed starters, etc. A "Key to Symbols" and glossary of "Common and Important Terms" will assure you of complete understanding all the way through this useful book. **Allen-Bradley Co.**

. . . for your copy, circle No. 201

Corrosion control in air conditioners

Treatment of water in humidifying, air conditioning, recirculated water systems, etc., is analyzed in this studious but easy-to-understand report. It tells of a compound designed to inhibit scale formation, control slime and algae growth, and control water pH. Sections include a general description of the compound . . . where it can be used . . . how to use it . . . maintenance . . . methods . . engineering assistance available. **Oakite Products Inc.**

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Truck Engineering bulletin

A new concept in fork truck brakes is detailed in this fact sheet. Called "tri-safe" braking system, operation includes three separate braking actions: dynamic—which serves to slow down the truck using the drive motor as a generator to provide braking action; hydraulic—for normal braking service with power operated hydraulic brakes in each drive wheel; mechanical—for emergency stops and parking by use of a spring applied mechanical brake located on the propeller shaft. Specs and pictures are included and serve to highlight this very complete truck braking system. **The Elwell-Parker Electric Co.**

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Customized sling chains tailored to your needs

Read all about a sling chain program, custom made for those who need sling chains quickly and yet insist upon factory approved and guaranteed components in the assembly. This manual tells how these customized sling chain assemblies are made up of cam-alloy chain, master links and hooks coupled by Wedglok nickel alloy connecting links. By simply stocking the necessary components, a sling chain can be assembled and put into immediate service. Complete specifications for all components are listed . . . and an assembly chart tells you at a glance how these chains are put together and what they can do. **Campbell Chain Co.**

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Engineering data on industrial cooling towers

Sixteen pages crammed with engineering facts and figures are what you get in this manual. It tells of cooling towers distinguished by: low silhouette . . . high performance . . . available in two heights . . . attractive appearance. Clear-cut photos show you the framework, exterior treatment, water distribution system, and filling and drift eliminators. Then massive photos let you look into all mechanical features. Typical cross sections appear throughout the rest of the book . . . and engineering data tables fill you in on the remaining facts. All dimensions, sizes, arrangements, etc. are detailed in engineering drawings. **J. F. Pritchard & Co. of Calif.** **. . . for your copy, circle No. 205**

A hoist that gives you a lift

You know anything that lifts is a hoist. That's why this hoist firm makes Oilifts for fast, low cost handling and safe, easy lifting. You can find out about it in this four-page manual which tells how these lifts speed loading of trucks and trailers . . . eliminate ramps and runways . . . expedite machine feeding and discharge. Photos illustrate each of these major advantages of the lifts, and a clear-cut diagram shows you how these oilifts work. Check the specifications and ordering information on the back cover . . . and the other facts on this hoist that gives you a lift. **Globe Hoist Co.**

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Water softeners to meet individual plant requirements

How basic standard water softener designs can be easily adapted to meet individual plant requirements is set down in this six-pager. Construction features of the sodium zeolite water softeners are detailed and a table shows softener capacity and specifications. Other tables, cutaway diagrams and photos show how the units work and how they can be simply and effectively applied to your particular applications. **Allis-Chalmers Mfg. Co.**

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Versatile electric car

Designed for service in a variety of industrial, warehousing and terminal applications, the electric cars described in this brochure are weather-proof and can be used indoors or outside the plant. Featured in the brochure are pictures, specs and diagrams illustrating items of immediate interest to you, namely Air-Vac suspension for comfort rides, a diode charger which automatically guards against overcharging by reducing to a low maintenance rate as battery voltage builds up, and Lub-O-Matic drive for simplicity of operation. You can read about the technicalities of this drive system on page 3. **Laher Spring & Tire Corp.**

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The big advantages of Taper-Lock mounting are now available for practically all of your sprocket installations. Below is listed the new wide range of types and sizes offered by Dodge!

This important expansion of the Dodge line is the result of the enormous popularity of the Taper-Lock idea. Taper-Lock Sprockets are *modern*. Industry likes them because they go straight from shelf to shaft without machining—saving time. They are "easy on—easy off"—saving work. Their bushings can be re-used, not only in replacement sprockets, but in sprockets of different sizes and also in Taper-Lock Sheaves, Couplings, Conveyor Pulleys. Taper-Lock saves inventory—and money!

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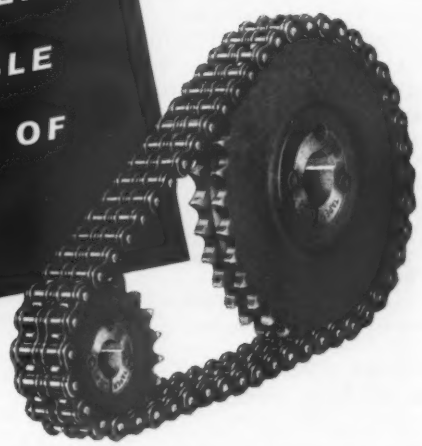

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  No. 35 to 160. Sprockets to 112 teeth.
- ***DOUBLE STRAND CHAIN and SPROCKETS***
  No. 35-2 to 80-2. Sprockets to 112 teeth.
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HELPFUL LITERATURE for the West's plant operating executives

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Grinding Wheel Institute issues safety booklet

An educational aid to the grinding wheel operator, this pocket-sized pamphlet deals with the safe and efficient use of products for that industry. Entitled "Safety Recommendations for Grinding Wheel Operation," the booklet employs laymen's language to discuss such technical subjects as maximum peripheral speeds, strength classification of grinding wheels, definitions of maximum speeds, safety guards, mounting procedures and other relevant subjects. It includes do's and don'ts for safe grinding and a handy table for use in converting revolutions per minute (rpm.) to surface feet per minute (sfpm.). **Grinding Wheel Institute.**

. . . for your copy, circle No. 225

Six-page selector chart lists 52 floor trucks

Designated as Circular 29-D, this two-color, six-page presentation describes and pictures some 52 different Lewis-Shepard floor trucks. Included are trucks with replaceable wooden decks, roller platforms, V-type decks, removable end and side racks, spring-loaded decks and steel shelving. In addition, the booklet describes numerous special units to handle such items as food, cable reels, paper rolls, spindles or cones, garments, glass or sheet steel, as well as countless other types of materials and goods. The various applications for each of the 52 floor trucks are covered in detail in the circular. **Lewis-Shepard Products, Inc.** . . . for your copy, circle No. 226

Booklet tells what's new in stainless steel

What's new in stainless steel is the subject of a six-page fold-out that describes new grades and finishes, new facilities, faster service, many grades, shapes and sizes, and the company's "Stainless Steel Library." **Armco Steel Corp.**

. . . for your copy, circle No. 227

Eight pages describe sling chain survey

A new eight-page, 9 x 6-in. booklet outlines the advantages of a sling chain survey. A complete explanation is made of the aims and purpose of a survey, the abuses that are uncovered, the actual survey procedure and the methods of communicating safety information to plant personnel. **Campbell Chain Co.**

. . . for your copy, circle No. 228

Steel buildings booklet shows off true colors

If attractive appearance is one of your major demands for steel buildings, this good-looking brochure will hit the spot, for it's in full color to show these products to their best advantage. The 16-page presentation tells what the company's building method is, describes four types of Armco buildings and three types of special steel covering materials. Accessories are detailed, specifications given, and interior finishes—ranging from simple to elaborate—are explained. Typical uses are shown to reveal what a wide range of building needs the Armco method can satisfy. **Armco Drainage & Metal Products, Inc.**

. . for your copy, circle No. 229

Manual gives facts on wheels and casters

Casters and wheels of all kinds are treated in this manual which covers many of the company's new items. Detailed in the publication are 60 series brake casters; 4L type casters with zero pressure tires; 4L type casters with pneumatic tires; Darnelloprene (phenolic resin) wheels in 60 through 400 series casters; information on grey non-marking and electrically conductive Darnelloprene wheels, and 60 and 70 series wheels with graphite—self-lubricating—type bearings. **Darnell Corporation Ltd.**

. . . for your copy, circle No. 230

High voltage control line discussed in booklet

A complete line of high voltage control apparatus is the subject of this booklet which discusses the general features of the line, as well as individual characteristics of both full and reduced voltage types of high voltage control for squirrel cage, synchronous and wound rotor motors. Ratings, dimensions, bulletin numbers and optional features are also included in the 16-page, 8½ x 5-in. manual. **Cutler-Hammer Inc.**

. . . for your copy, circle No. 231

How industrial TV can boost your operating efficiency

How TelAutovision—industrial TV—can increase your plant efficiency for just 48 cents a day is convincingly explained in this four-page booklet. What it can do for you in production, material and quality control; in engineering, maintenance, and transportation, as well as other fields, is described with text, drawings and pictures. **TelAutograph Corp.**

. . . for your copy, circle No. 232

Eight-pager describes highly tenacious sealant

A sealant for joints where an absolute watertight seal is needed — including those where extreme contraction and expansion occur—is the subject of a detailed eight-page brochure about Hornflex Thiokol Lp-32. A two-part polysulphide rubber-based compound, this substance is thoroughly explained with charts on physical properties, and data on advantages, use, directions for application, mixing instructions, quantity estimation and proposed architectural specifications. Uses described include curtain and window wall construction, sealing glass to metal, metal to metal mullions, door jambs, metal sash, for precast concrete, stone brick or masonry, sealing metals, panels, etc. **A. C. Horn Companies, subsidiaries and divisions of Sun Chemical Corp.**

. . . for your copy, circle No. 233

Booklet introduces new platform stacker

A five-color brochure describes the new platform stacker which is in addition to a growing line of Transporters, operator-led industrial trucks. The new platform stackers measures only 28⅜ in. from the face of the platform to the bumper of the power unit, with telescopic lift to make these trucks virtual aisle savers. The WLT will operate in a 64½ in. right angle aisle with a 48 in.-long by 36-in. wide load. It is available in 4000, 5000 and 6000 lb. capacities with platform lengths, widths and lowered heights plus telescopic and non-telescopic lifts to fit all applications. **Automatic Transportation Co.** **. . . for your copy, circle No. 234**

Case history: Material Handling in metal industry

Here's a case history bulletin describing how a metal-working plant was able to automate its material handling techniques, while at the same time gaining 4500 sq. ft. of floor space. Called case history bulletin 349-1, the 4-page two-color presentation is fully illustrated with a series of in-plant photos. It takes you throughout the plant from receiving to production and shipping. Read how other people in the metal working industry are solving their material handling problems. **Lewis-Shepard, Inc.**

. . . for your copy, circle No. 235

Roller gravity handbook provides reference source

Recently released, this new roller gravity handbook provides a reference source for the engineer who uses conveyors to solve unit load handling problems. It contains many descriptive illustrations and photos explaining the application of gravity conveyors and the more common accessories. Easy to read charts and graphs are included to assist you to match a conveyor to the loads. The book has a new flavor in that it points out conditions to be avoided. Its 50 pages are filled with facts helpful to any business that handles materials. **Lamson Corporation.**

. . . for your copy, circle No. 236

Aluminum mill products listed in 24-page booklet

General information, description of characteristics and typical properties for Kaiser Aluminum mill products are given in a new fully illustrated 24-page booklet. Products described include various types of sheet, plate, foil, rod, bar, wire, extrusions, tubing, forgings, billet and pig, as well as roofing and siding, ShadeScreen, process pipe, mining and construction pipe, irrigation tubing, portable cords, bus conductor, building wire, machine tool wire and welding cable. A feature of the new mill product booklet is the listing of material in tabular form for easier reference and comparison. Diagrams, photographs and drawings are also used. Tables on pages 4-7 compare the non-heat treatable and heat treatable wrought alloys by describing applications, chemical composition, available form and tensile, mechanical and physical properties of each alloy and temper. **Kaiser Aluminum & Chemical Sales, Inc.**

. . . for your copy, circle No. 237

Winter issue of CONFAB features stories on steel

A story which describes how steel strapping is being used to effect handling economies throughout the metals industry is the feature story in the Winter, 1958, issue of CONFAB, external publication of Acme Steel Co. The story tells how heavy-duty steel strapping is saving time and money in packaging and shipping operations from self-palletizing aluminum ingots to unitizing railroad car sections and securing cast iron pressure pipe in gondola cars. A second feature story describes how the toy industry uses wire stitching machines to assemble a variety of toys, and numerous other articles report new and current ideas on the use of Acme Steel products. **Acme Steel Co.**

. . . for your copy, circle No. 238

40 pages of selection data for belt conveyor idlers

"Belt Conveyor Idlers," Book 2716, contains detailed engineering selection data on five new series and 23 types of belt conveyor idlers and illustrates their versatility for a wide range of conveyor applications. The new 40-page book lists a complete line of idlers for belt widths of 14 to 84 in. All idlers are equipped with inverted angle bases and removable steel retainer clips. "Grease-through" feature permits lubrication of all rolls simultaneously from a single fitting. The booklet is conveniently key indexed for easy reference to aid in selecting the exact idlers to match your specific requirements. **Link-Belt Company.**

. . . for your copy, circle No. 239

Technical data card on Croloy properties

Engineers, purchasing agents—and others responsible for procurement of stainless tubing, pipe and welding fittings take note—here's something you need. It's a technical data card detailing the high temperature properties of Croloy, its chemical composition, size ranges, and short time tensile and rupture properties. Croloy, an alloy developed initially for resistance to corrosion, is being used increasingly throughout the West in heat exchangers, steam superheater tubing, steam piping and other high temperature applications in the process industries. **The Babcock & Wilcox Co.**

. . . for your copy, circle No. 240

Facts, photos concerning the Model 1050 Table-Veyor

A new brochure, complete with illustrations, application photographs, and complete drawings and specifications of the new Rapistan Model 1050 Table-Veyor conveyor, explains the many uses of the unit, including its many applications in both industry and commerce. A complete listing of detailed specifications, including lengths, widths, and working heights available, is also a feature of this brochure. **The Rapids-Standard Co., Inc.**

. . . for your copy, circle No. 241

Fact sheets on Quik-Vac, blowtorch and blowers

Need a blowtorch? a portable cleaner with big capacity? a hot-or-cold air blower? or a boosting blower to increase your furnace efficiency? These four Cadillac products are separately covered in four illustrated fact sheets. Complete descriptions are given for each and include specifications and outstanding design features. The blowtorch has a safety mixing chamber, air velocity of 11,500 ft. per min., capacity of 50 cfm., and water lift of 17 in. The Quik-Vac cleaner vacuums wet or dry, blows, air sweeps, sprays and has some 70 attachments available. The 1/3-hp. blower has one simple control for providing air blast of about 160 deg. F. air or room temperature air. The booster—which comes in both general and heavy-duty models—requires no compressor, mixing tank or air piping. **Industrial Products Division, Clements Mfg. Co.**

. . . for your copy, circle No. 242

Here's how to get the most out of your lift trucks

Put this one in your pocket and use it often as a check guide to getting the most out of your lift trucks. Its twenty-four, 7 x 4-in. pages are filled with pertinent drawings—some to make you chuckle—that will show you how to do your job better and more efficiently. Pages 16 to 20 contain important safety rules and following that are sketches to illustrate tricky maneuvers done the simplest way. **Allis-Chalmers Co.**

. . . for your copy, circle No. 243

64-pages on wrought iron for drainage systems

A new 64-page booklet, "4-D Wrought Iron for Building Drainage Systems," provides a comprehensive discussion on piping for soil, waste, vent and downspout applications. Among the book's nine sections are reports of building piping surveys conducted by independent engineers. Results of these surveys are accompanied by photographic examples of vent corrosion. Other sections describe the corrosive conditions encountered in drainage services, comparative service records, Durham versus Bell-and-Spigot systems, typical installation and performance tables. Piping economy is discussed and cost comparisons between low maintenance and low-initial-cost materials are illustrated. Specifying and tabular reference data for both 4-D wrought iron pipe and nipples are also included. **A. M. Byers Co.**

. . . for your copy, circle No. 244

Eight-page manual tells you how to strip paint

Here's an eight-page answer to your questions on how to strip paint, fully explaining four proven methods—hot flow-on, tank immersion, steam gun stripping and manual brushing. Advantages of each method and 12 products for use in the processes are detailed. Other data deals with what you should do after stripping, and points on storage protection. **Oakite Products, Inc.**

. . . for your copy, circle No. 245

All about enclosed switches for use in industry

A newly revised Catalog—83c—covering a complete line of industrial enclosed switches gives details on nine housing groups of metal-enclosed switches for industrial uses. Explosion-proof, maintained-contact, pre-wired, hand-operated and sealed switches are a few of the 99 different listings shown. The new 20-page catalog lists switches with a variety of actuator types, to fulfill almost any requirement for general-purpose industrial enclosed switches. For users who require great adjustability or extra-severe environmental resistance, the heavy-duty switches detailed in new Micro Switch Catalog 84 will be well suited. **Micro-Switch, a division of Minneapolis-Honeywell Regulator Co.**

. . . for your copy, circle No. 246

Bulletin describes electric pallet Lo-Lift truck

Illustrated with photos and charts, this Bulletin 587 gives complete engineering data and specifications on turning radius, ramp clearance and dimensions for the Powerox Model PXG electric pallet lo-lift truck. The fast operating, powerful Model PXG is built in 4000 and 6000 lb. capacities. A compact drive mechanism with motor and transmission directly above the drive wheel reduces overall length and allows the operation in six-ft. aisles with 48x48-in. pallet loads. Power lifting and power lowering by pushbuttons gives positive control over retraction and extension of the rear wheels. The improved hydraulic unit has motor, pump, overload relief valve and reservoir in a single package unit. New "Flying Saucer" pallet entry discs on fork ends give the effect of three added inches of roller diameter to help skim forks into pallet with ease. A thumb-touch butterfly type control on the handle gives two speeds forward and reverse. Total lift is 4 in. **Barrett-Cravens Co.** **for your copy, circle No. 247**

Data on portable elevators for vertical handling

An industry-sponsored reference guide, this 2-color, 20-page booklet is titled "The Portable Elevator for Vertical Material Handling." It presents in complete detail exactly what the portable elevator is and illustrates its advantages and applications for vertical material handling. It also gives helpful data on how to select portable elevators; reviews the various types; offers basic information on lifting-lowering mechanisms, sources of power, lifting-lowering carriage variations, and outlines several other special features of the portable elevator. One page is devoted to the 92-year history of elevators used by industry for vertical material handling. According to ALTAPEM, national trade association of member-companies who make and market portable elevators, the new booklet is primarily a basic reference guide to create better understanding of this product and its uses, and should be beneficial reading for material handling men, purchasing agents, industrial supervision, etc. **Association of Lift Truck and Portable Elevator Manufacturers.**

. . . for your copy, circle No. 248

Seven short cuts to greater profits

Hunting for short cuts to greater profits? This Equipto booklet reports on seven of them, all dealing with lowering your overhead by use of steel shelving, lockers, benches . . . and other methods you can read about in this publication, Equiptogram No. 256. Each short cut is fully explained with text, pictures and sketches to convince you further of its value, and the introductory pages discuss space, indirect labor and down time. **Equipto.**

. . . for your copy, circle No. 249

14 types of cylinders— 350 strokes and diameters

Engineering data on 14 types of hydraulic cylinders with over 350 strokes and diameters is included in this 12-page manual. Tables, charts and diagrams point to outstanding features of these cylinders (including heavier walls, shafts . . . cast steel clevises . . . welded construction, etc.). Each series of cylinders is presented with a cutaway diagram revealing the guts of each unit . . . then you have a specification chart listing diameter, stroke, clevis pin dia., pipe thread, capacity per 100 lb. pump pressure. And you can find out more about the stroke controls that are indestructable . . . and how these cylinders can fit any type of air or oil application. A handy index on the front of the book pictures each unit and tells what page it is on. In this way, you can go right to the cylinder for you. **Turlock Iron & Machine Works.** . . . for your copy, circle No. 250

4-page brochure deals with straddle carrier

A four-page brochure describing a new straddle truck carrier has details on such advanced design features as greater power, better maneuverability, smoother ride, and improved operator comfort. It contains all specifications on the 30,000-lb. capacity carrier. **Hyster Co.**

. . . for your copy, circle No. 251

Bulletin tells all about metal-clad switchgear

Construction and design features of a metal-clad switchgear are described in this new bulletin which explains the completed enclosure of all live parts, segregation of circuits, and all grounded metal barriers for maximum safety. The switchgear provides multiple interlocking, a universally adaptable cable comment, easy breaker insertion, "Pyro-Shield" insulation, automatic, positive-action shutters, trunnion-mounted potential transformers, and accessible current transformers. **Allis-Chalmers Mfg. Co.**

. . . for your copy, circle No. 252

Proper selection of your handling equipment

Methods of selecting correct material handling equipment are detailed in a 2-page, fully illustrated article in this 16-page magazine. Achieving maximum space, time and manpower savings, etc., are highlighted in the Fall issue of the Lewis-Shepard Lever, that's been especially prepared for companies and individuals interested in material handling. There's also a semi-technical article on the science of hydraulics as applied to fork lift trucks. Other features of the magazine include case studies of the profitable application of material handling equipment in a wide range of industries—each illustrated by a series of actual installation photos. **Lewis-Shepard Products, Inc.**

. . . for your copy, circle No. 253

Complete regulator line described in 36-pager

A new 36-page catalog covering a complete line of cylinder, manifold and station pressure regulators contains flow and pressure specifications, as well as inlet and outlet connection dimensions, for each regulator. Adapters, station valves, flowmeters, hose connections and pressure gages are also described in detail in the illustrated booklet. **Air Reduction Pacific Co.** . . . for your copy, circle No. 254

Getting the most out of torque shovel-cranes

"How To Get the Most Out of Shovel-Cranes with Torque Converters" is the title of a new 16-page booklet. Since the torque converter in shovel-crane applications is relatively new, the purpose of this illustrated booklet is to offer tips that will assist an operator in getting greater production with less effort from a machine equipped with an engine-converter combination. Prefacing the tips on operation and maintenance is an introductory explanation of what torque is and how it applies to shovel-cranes. Immediately following is a comparison of performance differences between torque converters and fluid couplings. **Link-Belt Speeder Corp.**

. . . for your copy, circle No. 255

New power and free overhead conveyor

This booklet describes the new Power-Flex power and free overhead conveyor which is designed for industry-wide application. A feature of this engineered system is the unique Telematic Route Selector Dispatch Head which can be furnished with each carrier. The route selector dial can be set to automatically guide a carrier to any one of 80 stations in the system. The complete Power-Flex system, its components and the Telematic Dispatch are illustrated and described in detail. **Columbus McKinnon Chain Corporation, Conveyor Division.**

. . . for your copy, circle No. 256

Practical information kit on coated abrasives

A new, practical information kit to make it easier to specify and order coated abrasives is now available. In the kit is a Buyer's Guide, with convenient reference tables and forms for listing your requirements; a Selector Chart for Metalworking Operations; Selector Chart for Woodworking Operations; a compact brochure, Basics in Coated Abrasives for the Metalworking Trades; and a brochure, Basics in Coated Abrasives for the Woodworking Trades. Brief, factual, classified for quick, easy reference, any or all of the kit is available. **Carborundum Co.**

. . . for your copy, circle No. 257

Engineering, application book on Tramrail line

Loaded with pictures, this revised engineering and application booklet gives the full story on a versatile line of overhead material handling equipment that can solve practically any handling problem. The 12-page brochure presents detailed studies of track design, peening and stresses, and covers various types of carriers, cranes, tractors, track switches, buckets, grabs and electrification. The dozens of photographs show the products and also illustrate a wide range of overhead material handling installations in diverse industries. **Cleveland Tramrail Division of The Cleveland Crane & Engineering Co.**

. . . for your copy, circle No. 258

NEW EQUIPMENT for Western plant operation production, and maintenance

USE RIP-OUT POSTCARD, page 69, for more information on products described

SELECTA-BORE SPROCKET ASSEMBLY
. . . cuts inventory by 2/3

This unique and ingenious finished bore stock sprocket assembly called Selecta-Bore provides more rapid off-the-shelf service to roller chain sprocket users. According to the manufacturers, Selecta-Bore sprockets provide a complete line of over 600 possible pitch, teeth and bore size combinations for better and faster service, yet reduce inventory by two-thirds for the range of sprockets previously required. These sprockets permit you to fill finished bore sprocket requirements by assembling interchangeable plates and hubs, affording a combination that provides a complete line of finished bore sprockets with minimum sprocket inventory. Each assembled sprocket is ready for installation by the user, complete with standard keyway and setscrew. No reworking is required. **Whitney Chain Co.** . . . for more details, circle No. 275

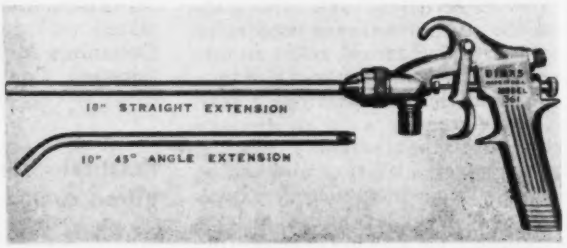
REACTION TORQUE MOTOR BASE
. . . for all NEMA sizes through 505

This new reaction torque tilting motor base for automatic belted drive tension control under changing load conditions is available in bases to accommodate all NEMA sizes through frame 505 as well as for special applications requiring larger frames. It makes possible more efficient use of space because of its compact design. Engineered on the principle that action and reaction are equal but opposite, the motor base's reactive torque is directly proportional to the horsepower. The belt tension increases and decreases as the load varies. **Allis-Chalmers Mfg. Co.**

. . . for more details, circle No. 276

INDUSTRIAL CLEANING GUN
. . . offers higher fluid capacities

Designed to meet the demand for a more economical production cleaning gun in the aircraft, automotive and industrial engine fields, the new Model 361 industrial cleaning and degreasing gun will serve where greater fluid capacities are required. It will satisfy all cleaning booth requirements where varsol, kerosene, naptha, and similar industrial cleaning solvents are used. Versatility is increased by a 45-deg.-angle ten-in. extension; the gun may also be had in the straight ten-in. extension. A trigger control operates both the air and cleaning fluid, and the gun will operate with a pressure tank or by gravity feed. Conversion of the firm's current



Model 36 guns to Model 361 can be accomplished by installing a 56-742 nozzle and 56-744 needle on Model 36. **Binks Manufacturing Co.**

. . . for more details, circle No. 277

HIGH TENSILE ELECTRODE
. . . for structural steels

A new type of high strength welding electrode for mild steel, low carbon and low alloyed steels —EutecTrode® Super 110 (a.c.-d.c.)—combines unusually high strength of over 110,000 psi. with exceptional elongation to completely eliminate any cracking tendency, which is valuable to joining heavy sections under restraint. No restrictions are placed upon joint designs, size or position. Typical applications for this controlled penetration electrode include low alloyed steels for high strength, sub-zero service, and steels with low percentages of nickel, chromium, molybdenum and manganese. T-1 and other copper-containing steels are also recommended. Ideal for welding pressure vessels, tanks and other assemblies requiring extensive post heat treatment, it is also used for structural steel, such as angle iron, channel iron, beams, gusset plates and scaffolding. It is available in 3/32, 1/8, 5/32 and 3/16 in. diameters. **Eutectic Welding Alloys Corp.** . . . for more details, circle No. 278

TOOL STORAGE UNIT
. . . has 78 compartments

Designated as Model 181, this tool storage unit has 78 compartments for the storage of drills, reamers, taps and other tools. Its two top shelves have 15 compartments, 2-3/16-in. wide, two center shelves have 13 compartments, 2-9/16 in. wide, and two bottom shelves have 11 compartments, 3 in. wide. Constructed of heavy gage steel finished in oven-baked enamel, it comes in gray or green. All compartments are separated by 1½-in. high dividers. All shelves have label holders, turned up to form bin fronts. The unit can be used alone or will fit into standard shelving arrangements. It is 33¼ in. wide, 16½ in. deep and 34⅝ in. high. **Penco Div., Alan Wood Steel Co.** . . . for more details, circle No. 279

Alan Wood Super Diamond floor plate ...is easy to fabricate

Wherever necessary, A. W. Super Diamond rolled steel floor plate can be sheared, formed, welded, and easily matched. The arrangement of the unique pattern allows you to bend it at any place.

This is a heavy duty floor plate that will last for years . . . and provide a safe, non-skid footing. No chipping, splintering or cracking . . . *and* no skidding. You save on cleaning costs, too . . . because A. W. Super Diamond is easily swept or mopped *from any direction*. It drains freely . . . no pockets to hold dirt.

For easy fabrication and installation . . . for safety . . . for long wear . . . specify A. W. Super Diamond. Write for Bulletin SD-N 6.

ALAN WOOD STEEL COMPANY
CONSHOHOCKEN, PA.

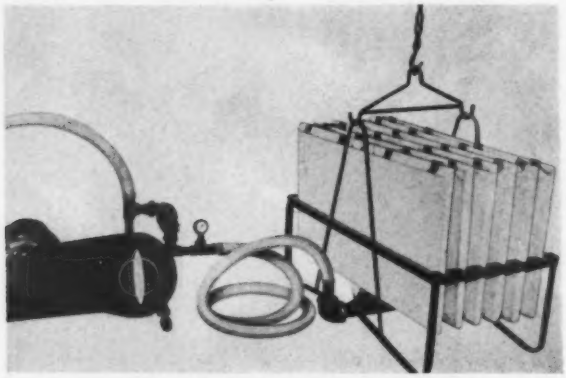
DISTRICT OFFICES: Philadelphia • New York • Los Angeles • REPRESENTATIVES: Atlanta • Boston • Buffalo Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle Montreal, Toronto and Vancouver, Canada—A. C. Leslie & Co., Ltd.

. . . for more details, circle No. 42 on Reader Service Postcard

NEW TYPE OF FILTER

. . . to remove stearines from winterized oil

In this new type filter Model RW for the removal of stearines from winterized oils the filtration process includes vacuum type filter plates operating in



an open tank cooled to 45°. The manufacturer claims that since no pressure is used, the problem of the extremely low compressive strength of the stearine cake is eliminated. Also, no cold room is required. At the end of the filtering cycle the plate assembly with the stearine cake is lifted out and immersed in a melt-off and wash tank to recover the stearine. By using two filter tanks and one melt-off tank a practical continuous operation is achieved. The vacuum filtration principal as employed in this filter gives 2½ times greater flow per sq. ft. of filtering surface, over conventional methods. Engineering service for individual application is offered by the manufacturer. **Sparkler Mfg. Co.**

. . . for more details, circle No. 280

MEASURE-MARKING FOR CHAIN

. . . with color coding for 4 grades

Handling and identification of chain is greatly simplified by the recently-developed Measure-Mark method by which four grade of grades of chain are

marked every five feet in different colors to identify each of four grades. Color coding for proof coil, BBB, high test steel and Cam-Alloy grades identifies grade and manufacturer even though chain is separated from original container. Combined with this are new labels by which perpetual inventory can be kept, and establishment of a standard package so that the firm's chains will be sold by standard feet to a barrel, and wholesalers need not convert from pounds to feet for resale. **Campbell Chain Co.**

. . . for more details, circle No. 281

NEW ADJUSTABLE SPEED DRIVE

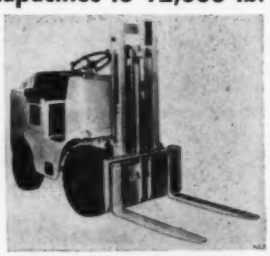
. . . from ¾ to 7½ hp., cuts maintenance worries

In the Ajusto-Spede® drive, which now comes in ratings from ¾ to 7½ hp. with a stationary field construction, all brushes, commutators and slip-rings have been eliminated to substantially reduce maintenance. The redesigned construction in these ratings also reduces the length of the drive up to 22%. Both the a-c. motor and eddy current clutch are built into a common housing. Drive shaft, height and diameter dimensions are the same as a standard motor of comparable rating. Motor end brackets are interchangeable with standard flanges and units can be flange-mounted to the driven machine. The drive is designed to supply precise operating speeds for machine tools, process machinery, test equipment, windups, conveyors, etc., and is suitable for continuous operation at full load (constant torque) in ranges up to 34:1 and for intermittent use from 0 to full speed, or any rpm. in between. The Ajusto-Spede drive features a tachometer feedback circuit that continually monitors the drive shaft and automatically corrects speed as required. Jogging or inching control is also standard. Optional control features include: threading; controlled rate starting; multi-point control; or tachometer follower control where the drive unit must match a speed established at some other point in the process. The Ajusto-Spede can also be operated by automatic controls such as temperature. **The Louis Allis Co.**

. . . for more details, circle No. 282

SAFEGUARD DIESEL FORK LIFT

. . . comes in 9 models, capacities to 12,000 lb.



This diesel-powered fork lift truck specially engineered to provide extra safety in areas and industries where additional safeguards are needed is available in 9 different models — with lifting capacities ranging from 3000 to 12,000 lbs. The new lift truck is completely devoid of electrical components and equipped with hydraulic starter, mechanically-operated fuel, temperature and oil pressure gages and a mechanical warning device. A low volatile fuel is used. The diesel-powered safety unit also features a water-cooled exhaust manifold and water muffler. The lift truck's hydraulic starting motor is actuated by fluid released by a pressure accumulator charged by the truck's hydraulic system. A hand pump also enables the lift truck operator to charge the accumulator manually, if necessary. The truck has an exhaust manifold connected directly to the engine cooling system, and a water muffler with sufficient capacity for a normal day's operation. A fuel flow control lever on the cowl is used with the starter actuator to start the lift truck and shuts off fuel when the truck's engine is to be stopped. **Towmotor Corporation.**

. . . for more details, circle No. 283

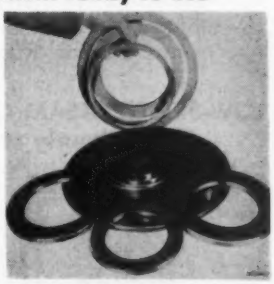
LIGHT WEIGHT PLATFORM TRUCKS
. . . with load capacities of 1,200 and 2,000 lb.

Made of magnesium in combination with other light alloy metals to give both light weight and high strength these new Model F platform trucks

are available in load capacities of 1,200 and 2,000 lb. According to the manufacturer, the trucks were developed to meet a growing demand for light-weight handling equipment of higher load capacities. Additional features include a tread plate deck surface, heavy-duty, cast corners, rubber tires and removable handles. All parts are standard and replaceable from factory stock. Optional equipment includes rubber bumpers, card holders, warehouse type end racks, etc. **Magline, Inc.**

. . . for more details, circle No. 284

MACHINE-CUT RINGS AND DISKS
. . . smooth edges make them ready-to-use



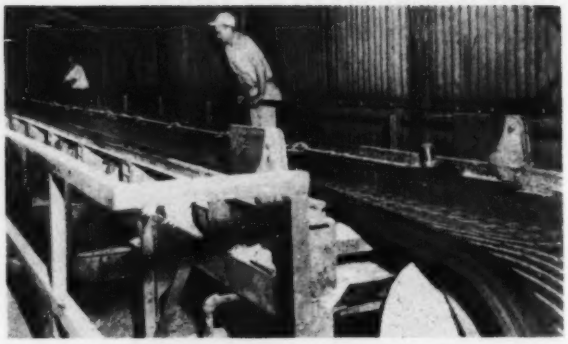
Machine-cut stainless steel rings and discs, such as pictured at left, may be secured at a cost that is generally less than if the products were first flame-cut, sheared or sawed and then machined to the required size and edge smoothness. Authority for this statement was Joseph T. Ryerson & Son, Inc., which supplies both flame-cut and machine-cut stainless rings and discs for corrosion resisting parts and components. For many purposes, it was said, the size accuracy and smooth edges of machine-cut stainless rings and discs make the material ready for use when received. Advantages of machine-cut stainless rings and discs include (1) size accuracy normally held within plus or minus 1/32 in. although cutting can be done to much closer tolerances when required, (2) edges are smooth, (3) normal flatness of plate is retained, (4) corrosion resisting qualities of the material are undisturbed, and (5) for many purposes, material is ready to use without need for further machining. Principal requirements for stainless steel rings and discs are in Types 304 and 316 and in the extra low carbon analyses Types 304L and 316L. Rings and discs can also be furnished in other stainless analyses. **Joseph T. Ryerson & Son, Inc.** . . . for more details, circle No. 285

ELECTRIC HOIST UNITS
. . . increased to 2-ton capacity

Capacity range in the Lodestar electric hoist has been increased to 2 tons and lifting speed has been doubled in the ½-ton and 1-ton sizes. Three new models are: The model L of 1-ton capacity at 16 ft. per min. . . . model J of ½-ton capacity at 32 ft. per min. . . . and model R with a capacity of 2 tons and lifting speed of 8 ft. per min. With these new additions to its line, the Hoist Division of Chisholm-Moore now provides a selection of lifting speeds and capacities ranging from ⅛ to 2 tons. **Chisholm-Moore Hoist Division, Columbus-McKinnon Chain Corp.** . . . for more details, circle No. 286

RIFFLE-GRIP CONVEYORS
. . . handle 3,500,000 lb. a day

Slippery pine chips are being handled at an average rate of 3,500,000 lb. a day at Crossett Paper Mills, Crossett, Ark., thanks to a riffle-grip conveyor belt 36 in. wide and 280 ft. long. Traction provided by the tire tread design surface has enabled the conveyor system to handle an increase of 20% in chipper capacity without additional

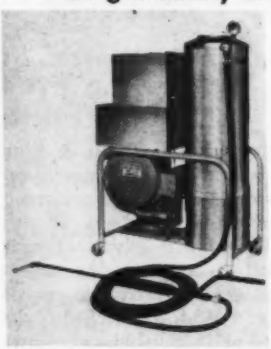


changes in conveyor equipment. The riffle grip belt, with its molded, chevron cover design, replaced a smooth belt which could not carry chips fast enough from the loading point. **B. F. Goodrich Co.** . . . for more details, circle No. 287

URETHANE CONTAINER
. . . does three jobs in engine assembly

A protective shipping container of rigid urethane foam is also a parts assembly jig and a checking fixture for solid fuel rocket engines. The container has a separate cavity for each part to be shipped. Parts are placed each in its cavity as the container goes down the line. Checking consists only of seeing that each cavity is filled. The urethane foam of which the container is made assures protection of the parts in transit. A wooden dummy is made to the size and shape of each needed cavity. Dummies are then mounted on a board for best utilization of space. The resultant mold is covered with a thin film of parting agent and a pallet is inverted over it. Previously mixed urethane foam of a special composition is admitted to the cavity through a hole in the pallet. Before setting, the foam completely fills the cavity, reproducing exactly each detail of the mold, which is then removed and can be used over again. **Dayton Rubber Co.** . . . for more details, circle No. 288

LOW-PRICED STEAM CLEANER
. . . 80 gal. hourly at 60-100 lb. pressure



The Handy Dandy steam cleaner is a new, simplified, low-priced unit designed specifically for use where cleaning operations have seemed too limited for economical steam cleaning, and for larger operations requiring an auxiliary or standby cleaner that is easily moved about. It delivers 80 gal. of solution hourly at the same 60-100 lb. cleaning pressure as larger steam vapor cleaners. It has the same type orifice-in-nozzle to assure a hard-hitting, straight-ahead cleaning stream, with minimum fogging. Air atomizing burner assures complete combustion of fuel—eliminating smoke, soot, and eye-irritating fumes. Operator regulates cleaning stream simply by setting burner control to pressure desired. Handy Dandy is offered in two models: oil-fired with caster mounting (pictured), or gas-fired for stationary installation. **Malsbary Manufacturing Co.** . . . for more details, circle No. 289

MULTIPLE WIRE FEED
. . . provides unlimited spring length

A multiple wire feed mechanism increases the feed length on segment-type coilers, through automatic multiple-stroke feed, so that all the most common long springs can be coiled accurately and rapidly to any desired length. Retaining the use of pitch, diameter and cutter mechanisms and the inherent accuracy of segment-type coilers, compression and extension springs (open or close-wound) with plain, squared, tapered and coned-down ends can be produced up to twice as fast as a clutch-type coiler of equivalent size. The multiple wire feed mechanism can be used with any set of extra wire feed gears that can be mounted on the basic machine. Standard cams can be used and, when a spring is being set up or adjusted, only that portion requiring camming need be coiled. A substantial saving in wire during setup can result, particularly on longer springs. **Torrington Mfg. Co.**

. . . for more details, circle No. 290

IMP TURBINE GRINDER
. . . for high-speed tool die finishing

A new single-stage high speed turbine grinder The "Imp", Model 7979—is a spunky little handful of power that does any kind of grinding or cutting where ⅛-in. shank mounted wheels or cutters can be used. It grinds, deburrs, cuts, polishes, and delivers 75,000 rpm. at normal 90-lb. airline pressure. The low cost of this tool, priced at $49.50, is made possible by its highly simplified design, according to the manufacturer. Vanes of the single-stage impeller allow a straight-through flow of pressurized air, so that exhaust air can be discharged at the spindle end of the tool, and chips and particles are blown away from the work. Specifications include: 75,000 rpm.; throttle, twist-type; motor, single-stage impeller; weight, 7 oz.; length over-all 4½ in.; spindle offset 9/16 in.; air inlet ⅛ in. female N.P.T.F.; collet size, ⅛ in. **The Aro Equipment Corp.**

. . . for more details, circle No. 291

ROLLING MILL MICROMETER
. . . makes measuring hot metals safe

A new rolling mill micrometer, especially designed for measuring sheet or strip metal as it rides off the rolls, has been developed. This rugged tool, with a one-inch range by thousandths is equipped with plastic handle and large winged locking screw to permit its use even while wearing large protective gloves. Rugged construction will withstand rough treatment in many steel mill and other applications. Extra large dull chrome finished barrel and thimble with large figures and black graduations provide ease of readability. Beveled spindle end and anvil allows the "mike" to slide smoothly onto work. Winged locking screws can be placed on either side for convenience. The anvil has simple zero adjustment and the relationship between the spindle and thimble is fixed so that it will not change because of excessive force in turning the thimble. **Brown & Sharpe Mfg. Co.**

. . . for more details, circle No. 292

CAM-TYPE CENTRIFUGAL CLUTCH
. . . for gradual engagement, high inertia starts

Designed to function in applications that have high operating speeds or medium pulsating loads, this cam-type centrifugal clutch affords quick release where necessary, and is ideal for electric motors or gasoline engine applications where gradual engagement is required or in operations starting from high inertia. In motor applications, it provides a low-line voltage protection since necessary starting current is greatly reduced. Much smaller motors can be employed when used with a centrifugal clutch since speed required for maximum torque is obtained before applying the load on high starting torque applications. Application of the new clutch also reduces the demand for starting current. When used with gasoline engines, the clutch provides no-load starting and no-load idling where constant loading is not desired. It offers a big advantage with lightweight high speed engines because of the inherent delay of the clutch so the load is automatically applied to the gasoline engine at its most efficient speed. Available in 1 to 30 lb/ft. capacities, with rpm. from 1200 to 3600, 4¼ in. OD, 7/16-1 in. diameter bore, the centrifugal clutch line can be adapted to pulley-, sprocket-, gear- or coupling-type drives mounted on either the driving or driven member. With drive mounted on driven member, clutch may be used as a power take-off. **Fairbanks-Morse & Co. (Magneto Division)**

. . . for more details, circle No. 293

GENERATOR OVERDRIVE
. . . maintains full battery charge at engine idle

A newly-developed generator overdrive system assures peak generator performance and constant battery charge for all types of automotive vehicles, even at curb idle with all accessories operating simultaneously. Called Gen-O-Drive, the unique overdrive works by instantly increasing generator rotation when the engine is idling or running at low speed. As engine speed increases, Gen-O-Drive automatically returns the generator to its normal operating rate. It has been fully field tested by industrial users who demand maximum electrical current at any engine speed to operate radiotelephones, fork-lift units and additional special equipment as well as headlights, radio, heater and air conditioning. **Consolidated General Products.**

. . . for more details, circle No. 294

BAR, TUBE STRAIGHTENERS
. . . with patented Syncro-Drive

A complete new series of 5-roll, rotary bar and tube straighteners equipped with patented Syncro-Drive has been announced. Syncro-Drive provides a superior method of entirely guideless, precision straightening. The finest possible quality of end-to-end straightness is achieved at high production speeds. And, with Syncro-Drive, users can now straighten materials otherwise difficult, or even impossible to straighten, such as thin-walled tubes and bars of stainless steel, brass, zirconium, titanium and other modern metals.

Previously thoroughly proven in small size machines, Syncro-Drive now is available in all sizes for tubes from 1/16" to 6" O.D. and bars from 1/16" to 4" dia. in all metals. Each size machine straightens a wide range of tube and bar sizes. **Sutton Engineering Co.**

. . . for more details, circle No. 295

PORTABLE PNEUMATIC EQUIPMENT
. . . for rapid, safe, efficient conveying

A new and versatile cost cutting portable pneumatic system designed to keep materials moving rapidly, has been placed on the market. Available in two standard models, No. 100 and No. 150, HOFFCO-VEYORS offer a proven new concept in material handling flexibility and are said to have provided an 80% saving in labor costs and increased plant efficiency by 20%. Equipped with inlet valves to take standard size 1½ to 2 inch vacuum hose, HOFFCO-VEYORS can be used as vacuum cleaners when not in use as portable conveyors. They provide rapid, safe movement and recovery of such materials as rock granules, plastic pellets and gritty or pulverized substances. They also convey a wide variety of dry materials and corrosive chemicals. **U. S. Hoffman Machinery Corp.**

. . . for more details, circle No. 296

"CABLE WAY" CONVEYOR
. . . features automatic discharge

"Cable-Way" overhead conveyors are now available with an automatic discharge system which can be adapted to many production and warehousing departments. Special features of the new materials handling system are: 1. Removable tote boxes, carried in the arms of open-ended carriers; 2. Air-operated roller conveyor sections which lift the tote boxes at selected stations, allowing the carrier arms

to slide free; 3. Air-operated pushers, which, on signal from a limit switch, push the tote boxes onto gravity roller conveyors at the selected stations; 4. Station selectors, mounted on arms near the tops of the carriers; 5. Limit switches, tripped by the station selectors, which operate the discharge mechanism. **Conveyor Div., The American MonoRail Co.**

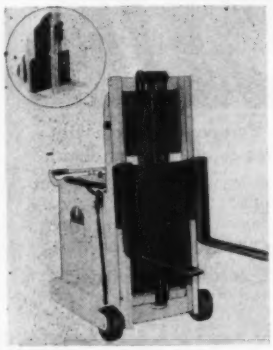
. . . for more details, circle No. 297

SMALL HOLE DRILLER
. . . stops small drill breakage

A "brand new" precision tool which makes small hole drilling simpler, faster and more economical is now ready for the market, for use on milling machines, jig borers, lathes and drill presses. You simply lock into position and control the drilling pressure with your finger tips. The manufacturer claims the Small Hole Driller pays for itself quickly because it practically stops drill breakage, and drills stay sharp up to 400% longer because you "feel" the correct cutting pressure. Precision made, each Small Hole Driller comes individually packaged in a plastic kit complete with adapter shank. **Hunter Tool.**

. . . for more details, circle No. 298

BATTERY-POWERED LIFT TRUCK
. . . 1000-lb., easy to handle



Known as the counterweighter this battery powered hydraulic lift truck is a 1000-lb.-capacity direct-approach material handling tool which has all the utility and versatility of other Big Joe lift trucks, plus the ability to handle **double faced pallets** in addition to wire coils, tote pans, rolls, dies, jigs, carboys, etc. Said to be the lightest 1000-lb. lift truck on the market, its unique counterbalancing principle makes it adaptable to any **specific** weight lifting problem from 1 - 1000 lb. It solves many elevator and other light load floor requirement problems previously inaccessible to mechanical handling solutions because it operates where other mechanized mechanical equipment cannot operate. Only 22 in. in overall width the Drum Tilter is ideal for solid drum stacking and travel within 24-in. aisles. The counterweighter works easily under extremely low ceiling limitations, yet lifts loads up to 90 in. heights. **Big Joe Manufacturing Company.**

. . . for more details, circle No. 299

WELL DESIGNED PUMPS
. . . centrifugal, circulating and coolant

If the pumps are as well designed as the 20-page booklet, then you've really got something. Neatly set down for easy glancing and reading are charts, graphs, features of horizontal and vertical centrifugal, circulating and coolant pumps. Dimensions and performance curves carry you along and engineering drawings stop you at intervals so you can study some of the outstanding parts. All units are explored with cutaway photos and installation diagrams . . . so when you finish the book you'll know what you want to know about centrifugal, circulating and coolant pumps. **Ingersoll-Rand.**

. . . for more details, circle No. 300

Reduce power requirements and operating costs here...

JEFFREY

RIVETLESS CHAIN

for general conveying systems, overhead trolleys, scrapers

CHAIN STRENGTH is achieved from heat-treating quality steel; addition of bulk weight only increases power requirements. Jeffrey drop forged, heat-treated Rivetless Chain ranges to a maximum ultimate strength of 130,000 lbs. The weight —9 lbs. per foot.

Within very broad limits, Jeffrey Rivetless Chain will operate over irregular courses in either vertical or horizontal directions.

Links and pins can be reversed when excessive wear is evident, thereby increasing chain life while greatly decreasing maintenance costs. Simplicity of design makes single link or section replacements fast and easy.

Jeffrey Rivetless Chain is detachable. Assembly is aided by the cutout portion of center link which allows the side bars to be brought together for ease of insertion or removal of the pin.

Whether replacing links or specifying a complete conveyor system, the Jeffrey district office or distributor in your area can make the job initially less expensive—ultimately more profitable.

Write for Catalog #899. The Jeffrey Manufacturing Company 920 North Fourth Street, Columbus 16, Ohio.

Jeffrey Scraper Conveyor with two strands of rivetless chain

Available in alloy heat-treated steel

STRONG...
without needless bulk weight

DETACHABLE...
for fast, easy assembly—lower maintenance costs

ADAPTABLE...
to irregular courses, vertical or horizontal conveyors

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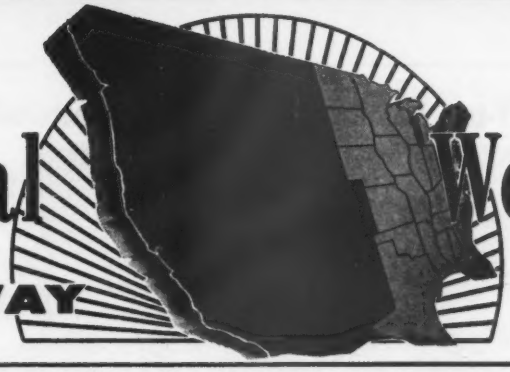
The Industrial West



ON ITS WAY

plants • production • distribution • personnel

What's Going On . . .

More and more of those "first and biggest for the West" developments, notably the televised opening of the Kaister Steel operation, as reported in this page's on-the-spot report from WI Editor, *Pete Dickinson*.

Another "biggest" story comes from National Supply Co. (see page 90) while on page 93 you can read about, Monsanto's plans for a computer-controlled chemical plant, also a first.

Lots of contract news on page 94 and details on expansions and new plants in Colorado, Arizona, Idaho and Wyoming and the Northwest on following pages add further bright tones to the industrial picture.

On pages 100 - 101 we've provided pictures and news of society sessions, promotions and the like.

WI News Editor
M. C. Tracy

Denver Firm Starts $700,000 Expansion

DENVER — The Sterling Steel & Supply Co., 500 Walnut St., has announced an expansion program which will cost $700,000 in its first phase and result in an expenditure nearly three times as large, according to *Jack A. Speyer*, general manager.

A 14-acre site has been purchased at West 48th Ave. and the Valley Highway on which a new shop building and a modern assembly line for handling steel products are now under construction.

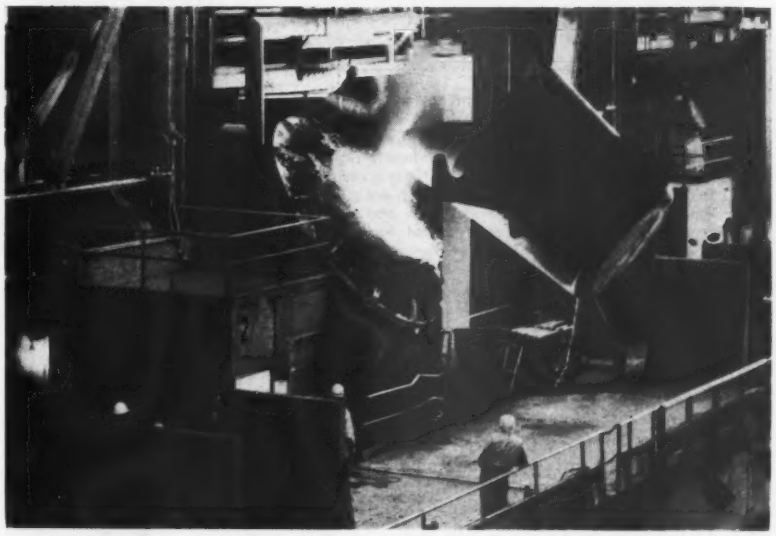
Sterling Steel specializes in distribution of steel products in the West and in fabrication and erection of structural steel for bridges and buildings.

Scott Paper to Expand Everett, Wash., Facilities

EVERETT, WASH. — Expansion of facilities that will result in 280,000 sq. ft. additional warehouse space here has been announced by Scott Paper Co., as part of a $7,000,000 enlargement of warehouse facilities and equipment, which also calls for construction in Chester, Pa., and Detroit, Mich.

Construction here is scheduled for completion late this year.

Kaiser Dedication at Fontana Works Begins New Era in Western Steelmaking



TILTED FORWARD in its charging position, one of Kaiser Steel's basic oxygen furnaces receives molten pig iron which has been produced in the blast furnace. This is followed by a charge of scrap steel. The oxygen furnace is then returned to an upright position, where it is charged with lime. Then a jet stream of oxygen is blown upon the surface of the molten steel to start the refining process, which takes less than 30 minutes. The furnace is then rotated to the pouring position and the molten steel is tapped into a ladle through the tapping hole.

FONTANA, CALIF.—A revolutionary steelmaking process—and with it a new era for industry in the West—began early this month at the dedication of Kaiser Steel's basic oxygen steelmaking facilities here.

The program, in which *Gov. Edmund G. Brown* and *Henry J. Kaiser* participated, also marked completion of all major facilities in Kaiser Steel's $214,000,000 expansion, begun 2½ years ago.

Governor Brown started the steelmaking process by turning the dial to start the jet of oxygen into the furnace. About a half hour later, Henry Kaiser pulled the lever to tilt the furnace and pour the first official oxygen steel—steel made in minutes instead of hours.

The largest industrial expansion in the history of the West, the program has virtually doubled Kaiser Steel's annual ingot capacity from 1,536,000 tons to 2,933,000 tons, making the Fontana plant the largest steel mill West of the Mississippi. The oxygen steelmaking installation is the third such to be built in this country.

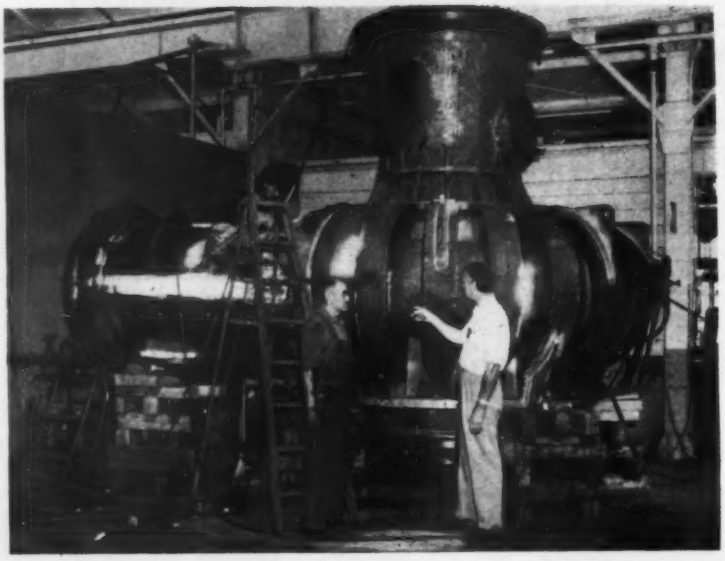
Key facilities in the Kaiser expansion include three basic oxygen steel making furnaces; a fourth blast furnace in which raw materials are converted into molten pig iron; a new 86-in. hot strip mill that turns out steel sheet and supplies semi-finished steel for use in the plant's tin plate and pipe mills;

Expansion of the tin plate mill, including construction of the West's first continuous annealer; a new plate mill; a new universal slabbing mill, only facility of its kind in the West; ninety new coke ovens; ten new soaking pits and improvements in the firm's company-owned and mined raw materials mines at Eagle Mountain, Sunnyside, Utah, and Raton, N. Mex.

The new process requires essentially

(*Continued on page 99*)

19-ton Castings Produced by National Supply



ONE OF SIX STEEL CASTINGS weighing more than 19 tons each, and regarded as among the largest, most intricate to be produced anywhere, is the case for this centrifugal pump shown during its final assembly at the Torrance, Calif., plant of The National Supply Co. The pumps are to be used in the Colorado Aqueduct System and were manufactured for Byron Jackson Pumps, Inc. Each of the six castings has an outside diameter of about 10 ft., and a diameter of more than 14 ft. over the discharge system. Each was cast in molding pits, requiring 89 separate cores, and then was machined and assembled with other components of the pump. National Supply also made the pumps' stainless steel impellers, which are about 78 in. in diameter and weigh some 9,250 lb. each.

Oregon Firm to Quadruple Capacity in New Plant

TIGARD, ORE. — Capacity of the new Nalley's, Inc. plant here will be four times that of the firm's former Springfield facility, which burned last summer. Construction of the new plant for production of potato chips began in January on a six-and-a-half acre site near here. Cost of the facility and equipment will be $350,000.

A potato chip cooker that can handle 1,000 lb. per hour will be part of the equipment. The building has been designed for the most efficient processing and for possible enlargement later.

Fresno Firm Begins $300,000 Expansion

FRESNO — Buckner Manufacturing Co. broke ground recently for a $300,000 expansion on a 10-acre site here. Initial unit will be a research and development laboratory. Buckner manufactures lawn and agricultural sprinklers and equipment for sprinkler systems.

Pacific Clay Products Sells Refractories Division

IONE, CALIF.—Pacific Clay Products' refractories division here was sold recently to Harbison-Walker Refractories Co. of Pittsburgh, Pa.

In regard to sale of the division, which has been generally inoperative the past year, *John D. Fredericks*, Pacific Clay Products' president, said that monies received from the sale will be used to expand and improve production facilities at the firm's three vitrified clay sewer pipe factories.

Columbia Wax Employees Share Company Profits

GLENDALE, CALIF.—A New Year's gift that will last throughout the year and those ahead is being enjoyed by employees of Columbia Wax Co., 530 Riverdale Ave., in the form of a retirement income profit sharing plan begun by the company.

The plan is retroactive, too, with benefits starting as of Jan. 1, 1958. All employees with one or more years of service are covered. Approved by the U. S. Treasury Department, the plan will be supported entirely by contributions made from profits by the company. Those eligible for retirement or retired for disability will also share in the program.

Continued growth of the company—the West's largest manufacturer of industrial floor polishes, waxes and cleaning materials—has made the program possible, Columbia Wax officials said. It is an addition to considerable other benefits now provided.

Modernization Scheduled at Reynolds Phoenix Plant

PHOENIX — The Reynolds Metals Co. has announced plans for a $550,000 modernization program at its plant here, according to *H. E. Miller*, manager of the plant.

All equipment in the aluminum extrusion plant will be modernized in the program slated for completion by April 1.

I-T-E Circuit Breaker Plans San Francisco Warehouse

SAN FRANCISCO—Ground breaking ceremonies in South San Francisco's Lindenville Industrial Park recently started construction of a major warehouse for the I-T-E Circuit Breaker Co., Philadelphia.

The $300,000 building will be a combination district sales office, warehouse and service center for the firm's low-voltage electrical equipment in this area.

The new building, owned by the Utah Construction Co., and leased to I-T-E, will have a total floor space of 20,000 sq. ft., of which 17,600 will be devoted to warehousing.

Scheduled for completion in April, the new warehouse will replace the firm's present district office at 116 N. Montgomery St., here. It will service an area including Northern and Central California, Oregon, Washington, Nevada, Utah, Montana, Idaho and Wyoming. *Thomas F. Malley* is San Francisco district manager.

The new center will enable the firm to give off-the-shelf service on air circuit breakers, switchgear, panelboards, insulators, power switching equipment and related low-voltage equipment. This is the sixth such center opened since 1956 and more are planned by the company.

M. C. Gill Corp. Enters Metal Honeycomb Field

SOUTH EL MONTE, CALIF.—The M. C. Gill Corporation has begun its third expansion in three years, with the building of facilities for production of metal honeycomb construction for aviation and missile use. Added space will provide a 50% expansion of Gill's present 18,000-sq. ft. plant capacity.

The new structure will be built after erection of a large overhead craneway and installation of degreasing, etching and washing tanks. It will join two plants presently occupied by the firm.

Full production of the new metal honeycomb division is scheduled for this month.

New Denver Firms

DENVER—The Rocky Mountain Tool & Machine Co., was recently incorporated here by *Willis E. Miller* and *George R. Reeves*, who have also incorporated a machine shop known as Empire Products, Inc.

Johns-Manville to Expand Production at Corona

CORONA, CALIF.—Immediate expansion of fiber glass production here has been announced by Johns-Manville Fiber Glass, Inc., newly-created subsidiary of Johns-Manville Corp., following its purchase of L.O.F. Glass Fibers Co.

For the million-dollar plant completed here last summer, the expansion plans call for additional machinery that will almost double capacity of the facility. This equipment, and similar machinery at the former L.O.F. plant in Defiance, Ohio, will be in operation by April or May.

Johns-Manville's acquisition of L. O. F., the second largest producer of glass fibers, includes seven plants and a research center at Waterville, O. The new J-M division will continue manufacture of fiber glass products previously marketed by L.O.F., including yarns, bonded mat, insulations, translucent plastic panels reinforced with fiber, glass and combinations of these with other products and materials.

Blaw-Knox Moves Western Headquarters to Millbrae

MILLBRAE, CALIF.—New Western headquarters have been established here at 305 Adrian Road by Blaw-Knox Co., Pittsburgh. Previous location was at 681 Market St., San Francisco.

In charge of West Coast warehousing facilities and sales of construction machinery and equipment is *William J. Conway*. *John G. McLain* heads up sales of steel plant equipment, roll sales and castings sales, while *Pierce Walinsky* is in charge of the heavy forms sales.

Blaw-Knox serves four major industrial markets—metal making and rolling; chemical, petroleum and food processing, highway construction and public works, and the public utilities industries.

Denver Firm Purchases James P. Marsh Corp.

DENVER — Colorado Oil & Gas Corp., has purchased the James P. Marsh Corp. of Skokie, Ill., according to an announcement from *W. C. Norman*, president of the Denver firm. The Marsh corporation is one of the nation's largest manufacturers of pressure gages for liquids and gas. Purchase price was $4,500,000.

Babcock & Wilcox to Make Boiler for Richfield Oil

LOS ANGELES—Babcock & Wilcox Co. will manufacture a "PFI"—power for industry"—boiler for the Watson Refinery of Richfield Corp. in Wilmington, Calif. The unit is scheduled to go on stream late this year.

The recently developed boiler has membrane wall prefabricated furnace construction, through utilization of welded tubular furnace wall panels. Designed for pressure of 775 psi., it will operate at 600 psi, and a steam temperature of 750 deg. F. At maximum continuous capacity, it will generate 300,000 lb. of steam per hr. for the refinery's processing system.

Ideas for Use of Industrial Tape Sought for 3M Contest

ST. PAUL—If you've an idea how using pressure sensitive tape can save material, time or money, increase plant efficiency or production, and improve the product or add to its sales appeal—the Tape-O-Rama contest is for you.

Sponsored by Minnesota Mining and Manufacturing Co., the contest is designed to emphasize use of industrial tape and taping equipment in all phases of industrial production and distribution. First five prizes are complete Westinghouse kitchens, including installation costs.

Any employee of an industrial manufacturing firm may submit reports of as many of his own tape-use ideas as have been initiated by his firm during the contest period — Feb. 1, through June 30, 1959. Pictures and drawings may be used to help illustrate ideas, but they are not required. The 135 prizes, including major kitchen appliances, TV sets, radios, electric blankets and mixers, will be given on the basis of cost saving, increasing profits, improving the product or other significant contributions.

Entry blanks and details are available from any "Scotch" brand tape distributor or 3M sales representative, or from Tape-O-Rama Contest, Minnesota Mining and Manufacturing Co., Dept. T8-406, 900 Bush St., St. Paul, Minn.

Trailer Manufacturing Firm Formed in Nampa, Ida.

NAMPA, IDA. — The Nampa Industrial Commission has announced the formation of a new trailer manufacturing company, Lieber Industries, Inc., here. The new factory will be located at 1324 Eleventh Ave., and will manufacture trailers under the trade name of Target. *Robert S. Lieber*, former sales manager of the Fleetwood Trailer Co. plant here, is president of the new firm. Production was scheduled to begin Feb. 1, with output planned for four units per day.

Metal-cleaning Plant to Build Facility

SACRAMENTO — Los Angeles By-Products Co., a firm that processes, cleans and shreds metal for use by Anaconda Copper Co., will build a plant near here. Initial plans call for a $100,000 plant on an 18-acre site north of Antelope.

U.S. Steel's Steel Products Unit Starts Modernization

LOS ANGELES — United States Steel's U. S. Steel Products Division here has begun an 18-month plant modernization program that calls for replacing 50,000 sq. ft. of existing wooden buildings with a new steel structure, plus providing a new production area of 60,000 sq. ft.

A realignment of production lines and streamlining of plant layout at the Vernon district facility will be included in the program, which began in January. The Steel Products division manufactures steel containers for the food, chemical and petroleum industries and is the West's largest producer of wheelbarrows, galvanized ware and garden tools.

The modernization program, planned for completion by mid-1960, has been scheduled so there will be no interruption of service or production at the plant, 5100 S. Santa Fe Ave.

Further Share in Temescal Process Bought by Stauffer

RICHMOND, CALIF.—The Stauffer-Temescal Co. has recently been incorporated under that name, following the purchase by Stauffer Chemical Co. of one-third interest in the development from Mallory Sharon-Corp. Stauffer now holds two-thirds interest in the venture and Temescal Metallurgical Corp., one-third.

According to *Dr. Donald F. Mastick*, general manager, the firm will continue development of the electron-beam melting process which has now been brought to a commercial scale. No immediate expansion of facilities is planned, he said.

During the last year the facilities were moved to a new location at the Stauffer site. Present address is 1201 S. 47th St.

The so-called Temescal process employs electron bombardment in a high vacuum to melt columbium, titanium, zirconium, beryllium and other materials which have high melting points and combine chemically with other materials easily.

Challenger is New Name for Hyster Truck Line

PORTLAND—A new name—Challenger—has been announced by Hyster Co. for its entire line of pneumatic tire lift trucks. The Challenger 60, 70 and 80 trucks are first to be released under the new name and represent a major step forward in industrial truck design, the company said. The newly-named line offers 17 basic models ranging from one to forty thousand lb. in capacity. SpaceSaver will continue to designate the firm's cushion tire line of industrial trucks.

Portland C of C Reports on 1958 Expansion

PORTLAND—A preliminary report from the Portland Chamber of Commerce sets $22,500,000 as the amount invested in industrial and warehousing construction and expansion during 1958 in this city's metropolitan area.

This growth created 400 additional jobs, of which 170 were provided by 48 new industries that invested $565,000 in land, buildings and equipment.

Metalworking, food and related products, furniture and finished lumber products were the predominant fields for new industries. Among these are All West Aluminum, C. E. Armstrong, California & Hawaiian Sugar Refining, F. & H. Mfg., Imperial Mfg., McIntosh Boat Works, Molded Pulp Products, Ramco Mfg. and Engineering, Rodgers Organ, Twin City Baker and Western Iron Works.

Capital investment of $8,500,000 represented expansions ($100,000 minimum) of 31 existing manufacturing concerns, which led to employment of 230 people. Among these were: American Can Co., Blitz-Weinhard Co., Columbia Laminating, Dairy Cooperatives, Dwyer Products Corp. of Oregon, Haley's Foods, Inc., Nalley's, Inc., Pacific Adhesives Co., Pak-Well Paper Products Co., Pennsalt Chemicals Corp., RT & E Corp., Sunny Brook Farms Co., Sweeney, Krist & Dimm and Van Waters & Rogers.

Warehouse and distribution facilities accounted for expenditures of $13,500,000, according to the Chamber of Commerce figures. Firms who constructed new facilities during the year include: American Cyanamid Co., Anderson & Westfall Co., Inc., Commission of Public Docks, Dayton Rubber Co., Louis Dreyfus Corp., General Petroleum Corp., Ross B. Hammond Co., Howard-Cooper Corp., Hudson House, Murray B. Marsh Co., Merck and Co., North Pacific Lumber Co., Oregon Transfer Co., Pacific Co-Operatives, United Grocers Inc. and Waterways Terminals Co.

U. S. I. Vernon, Calif. Plant Sold to Bethlehem Pacific

VERNON, CALIF.—The U. S. Industries, Inc., plant here has been sold to Bethlehem Pacific Coast Steel Corp., according to *John I. Snyder, Jr.*, USI president. Three divisions of the firm have operations at this facility and all will have new plant sites in the Los Angeles area.

The divisions are Axelson, which makes petroleum equipment; Clearing, which makes machine tools, and Western Design, where aircraft parts and related products are manufactured.

Elected by Paper Mill Men

DIRECTING AFFAIRS of the Paper Mill Men's Club of Southern California is this group of officers recently chosen for 1959. Left to right, they are Vice-President, **Harry W. Granger**, Oregon Pulp and Paper Co.; Secretary, **Jack C. Courtney**, Crown Zellerbach Corp.; President, **C. A. Meginniss**, Star Paper Co., and Treasurer, **Reuben Coatsworth**, Potlach Forests, Inc.

Jones & Laughlin to Handle Olin Aluminum and Brass

LOS ANGELES—The Metals Division of Olin Mathieson Chemical Corp. has appointed Jones & Laughlin Corp., Stainless and Strip Division, as its distributor for Olin Aluminum and Western Brass products.

From its warehouse at 2131 S. Garfield Ave. here, and branches in San Francisco, San Diego and Phoenix, the division offers complete stocks of both ferrous and non-ferrous metals under these trademarks. Jones & Laughlin has complete warehousing services, including facilities for tailoring metal to precise individual requirements.

Olin Aluminum products include sheet, plate, coil, rod, bar, extrusions, pipe and tubing. Western Brass products include brass and copper-based alloy sheet and strip.

New Mexico Manufacturers' Group Elects New Officers

The New Mexico Manufactures' Association recently elected *E. Willard Gray* as president. Others who took office Jan. 1 are *James W. Jones, Jr.*, first vice president; *H. L. Poulsen*, second vice president; and *Daniel A. Evatt*, treasurer.

Elected to the board for three-year terms were *Walter K. Wagner, Robert L. Tripp, James T. Hanlon, Wylie Banes* and *Jack Barnhill*. Elected to one-year terms were *Poulsen, John K. Hackney, Joe J. O'Connell*, and *Thomas G. Summers*.

Hydraulic Research & Mfg. Enlarges Burbank Facilities

BURBANK, CALIF.—Hydraulic Research & Mfg. Co. is expanding its facilities at 2835 Naomi St. here. Completion of the construction, which will add 29,000 sq. ft., is scheduled for early spring. The firm's products are hydraulic valves for aircraft and servo valves for aircraft and missiles.

First Computer-Controlled Chemical Plant Scheduled

DENVER — The Denver manufacturing plant of Thompson Ramo-Wooldridge, Inc., has an order to build for Monsanto Chemical Co. the first electronic computer designed to operate a chemical plant.

The chemical industry's first computer-controlled plant is expected to be in use by late this fall, *Howard K. Nason*, Monsanto's vice president and general manager of research and engineering, has announced.

"This will be the first chemical plant to use an electronic computer for the direct, on-line control of the over-all process," Nason said. "It will be installed in an existing manufacturing unit which is already highly instrumented by today's standards."

Location of the plant and the process involved have not yet been disclosed.

By using this unit, Monsanto officials hope to achieve maximum productivity from the plant at minimum operating costs, by continually monitoring the process conditions, making numerous calculations, and automatically adjusting the controls for optimum results, Nason said.

Skagit Steel Reopens Washington Munitions Plant

SEDRO-WOOLEY, WASH. — Reopening of the munitions plant of Skagit Steel & Iron Works here is underway following the awarding of a $1,024,800 contract from the San Francisco Ordnance District.

The plant, erected during the Korean emergency, will be "demothballed" for production of 106mm recoilless rifle cartridge cases.

More than 100 new jobs will be created in the community—recently classed as a surplus labor area—with the plant's reopening. The plant was closed in December, 1957. First delivery of cartridge cases is scheduled for March.

Hoffman to Build Research Center in Santa Barbara

SANTA BARBARA, CALIF. — A new research center, called the Hoffman Science Center, will be established here by Hoffman Electronics Corp. of Los Angeles. *Dr. Lloyd T. DeVore*, formerly with Stewart-Warner Corp., will head the new unit, which will be devoted solely to research, particularly dealing with solid state materials as used in transistors, diodes and other semi-conductor devices.

Weyerhaeuser Purchase

PORTLAND, ORE.—Weyerhaeuser Timber Co., Tacoma, Wash., recently purchased the United Wood Corp., flake board plant at West Memphis, Ark.

New Contracts Boost Western Industry

LOS ANGELES—An $80,000,000 contract —for the production of the Vigilante attack bomber, described as being worth its weight in gold—has been awarded by the Navy to *North American Aviation, Inc.*, here. The carrier-based aircraft is being designed to go more than twice the speed of sound and can carry nuclear bombs. North American's *Rocketdyne Division* also has received classified contracts from U. S. Army Ordnance for $4,380,730.

Other Ordnance contracts from the Los Angeles district include those for $22,000,000 to *Sperry Rand Corp.*, Sperry Utah Engineering Laboratory Division, Salt Lake City, for work on the Sergeant missile and equipment.

To *California Institute of Technology*, a $947,640 contract for research and development work to be performed at the Jet Propulsion Laboratory, Pasadena;

The Firestone Tire & Rubber Co., a $442,172 contract for Corporal missile repair parts;

General Electric Co., Phoenix, a $286,435 contract for digital computation facility operation at the U. S. Army Ballistic Missile Agency, Redstone Arsenal, and supplementary work at Tempe, Ariz.;

Dale Products, Inc., Albuquerque, a $143,033 supply contract for test equipment;

Interstate Electronics Corp., Anaheim, a $127,580 research and development contract;

Douglas Aircraft Co., Inc., Santa Monica, a $120,818 contract for Nike missile repair parts;

Solar Aircraft Co., San Diego, a $98,-850 classified research and development contract;

Gilfillan Brothers, Inc., Los Angeles, a $69,633 contract for Corporal missile repair parts, and

Douglas Aircraft Co., Inc., contracts $1,627,435 for missile repair parts and launching area items, and a $500,000 contract for supplies and services;

Nortronics, a *Division of Northrop Corp.*, Anaheim, contract for $1,887,-027 for development of missile check-out equipment;

California Institute of Technology, $1,481,433 contract for research and development work to be performed at the Jet Propulsion Laboratory, Pasadena;

Motorola, Inc., Phoenix, $303,458 contract for telemetry sets;

Norris - Thermador Corp., Vernon, $254,180 contract for cartridge cases;

Associated Aero Science Laboratories, Inc., Hawthorne, $108,523 contract for technical assistance;

Thompson Ramo - Wooldridge, Inc., $62,324 research and development contract for a telemetering system;

Harvey Aluminum, Torrance, $54,-878 contract for engineering and fabrication of components;

Missile Air Division, U. S. Chemical Milling Corp., Manhattan Beach, $48,-360 contract for bulkheads.

Houston-Fearless Corp., Los Angeles, a $52,732 contract for operation of photographic laboratory.

Other contract news in the West involves:

Lockheed Aircraft Corp.'s missile systems division, an Air Force contract for continued flights of the recoverable X-7 Ramjet tests missile—order expected to exceed $8,000,000;

Packard-Bell Electronics Corp., recipient of two contracts, totalling about $5,000,000, from the Navy for production of advanced electronic equipment;

Telecomputing Corp., a $3,069,000 contract from the Federal Aviation Agency for air traffic control beacon ground station systems, with work to be done by Brubaker Electronics, Inc., a subsidiary;

Monogram Precision Industries, Inc., a $600,000 contract from Packard-Bell Electronics;

Blaine Electronetics, a contract — valuation undisclosed—for design and manufacture of two transmitting antennas for the U. S. Naval Research Laboratory in Washington;

The Permanent Filter Corp., an Air Force contract to produce Perma-Dry water separation and filtering units to combat fuel icing problems in jet aircraft;

Convair Division, General Dynamics Corp., a Defense Department contract for two major studies, totalling more than $2,500,000, on advanced ballistic missile defensive systems;

Hiller Aircraft Corp., a $6,000,000 contract from the Army for production of the Raven three-place observation class helicopters;

BJ Electronics, Borg-Warner Corp., an additional Signal Corps contract for electronics equipment to provide a high-performance radio frequency test set;

The Systems Division, Consolidated Electrodynamics Corp., an order exceeding $220,000 from Convair for magnetic-tape recording and playback equipment.

Marquardt at Ogden Gets Huge Spin-Forge Machine

OGDEN, UTAH—Largest known precision metal forming machine in the world—the Hufford Spin-Forge—is scheduled for installation at the ramjet engine production facility of Marquardt Aircraft Co. here.

Production of lighter, stronger, close tolerance parts will be made possible by the 500,000-lb. 60 x 60-in. roll forming machine. Complex parts of many configurations can be formed and completed in one or two short operations by use of the machine, according to *Robert L. Earle* of Marquardt.

Before installation, the Spin-Forge, made by the Hufford Division of the Siegler Corp. underwent final tests at Hufford's El Segundo, Calif., plant.

Bay Area Food Firm Moves into $2,000,000 Facility

SAN FRANCISCO — A $2,000,000 plant and headquarters at San Leandro is being occupied this month by Lady's Choice Foods, a 41-year-old firm that is moving from its present location at 1237 Minnesota St. here. The new facility at 111 San Leandro Blvd. consists of a 12-acre site and buildings formerly owned by L. A. Young Spring & Wire Corp.

The new plant, covering 239,654 sq. ft., has been remodeled and equipped with latest design food processing machinery. Among this is equipment for the bleach operation which will make this line one of the fastest of its kind, a company spokesman said.

The firm's products include household bleach, liquid starches, pickles, jams, jellies and preserves.

The facility has concrete slab floors, overhead monorails, chain conveyor systems, and is equipped with a protective sprinkler system.

The food firm, which employs about 150 persons, has another plant in San Leandro as well as one in Hayward. The move to larger quarters was required by the expansion of the company's product line, calling for increased production facilities.

Door Manufacturing Plant Scheduled in Washington

CENTRALIA, WASH.—The Centralia-Chehalis and Olympia areas are under consideration by Cardinal Door, Inc., for establishment of a plant for the manufacture of doors. Selection of a plant location is under way and building plans, calling for a 12,000-sq. ft. structure, have been made.

Products of the new firm will be flush doors, some of them mahogany. Stiles and rails—or core material for the doors—would probably come from local sources, it is indicated.

President of the firm is *Wilbert F. Brewer,* Rochester, Wash. Others associated with the enterprise are from this area.

Palm Iron & Bridge Works of Sacramento Expands

SACRAMENTO—Extensive expansion and improvement work, costing some $150,000, has been completed by Palm Iron and Bridge Works, 15th and S Streets. Major addition is a 12,000 sq. ft. building that brings the total plant space to 82,000 sq. ft. Palm Iron and Bridge Works fabricates steel shapes and maintains one of the largest steel warehouse facilities in this area. The firm employs about 100 persons, with an annual payroll of $500,000.

Steel Fabricating Plant Established in Casper

CASPER, WYO.—The Hammond Wyoming Co. has established a new steel fabricating plant in Casper, according to *Fred J. Myers*, vice president of the Wyoming firm and general manager of the Hammond Iron Works, Western Division, Provo, Utah.

The Hammond Wyoming Co. operated for many years in Casper as the Hammond Iron Works, and purchased the Keyes Tank & Supply Co. in 1953. In 1958 the firm acquired the W. C. Kind Co., which handles steel erection for Hammond.

The new operation to be known as Plant No. 2, will be devoted exclusively to fabrication of structural steel. Its location is at Yellowstone Ave. and Elk St., previous site for Plant No. 1, which has been moved to Evansville where production of tanks and other plate work will continue.

Aircraft Firm Now Known As Northrop Corporation

BEVERLEY HILLS, CALIF. — Northrop Corporation is the name taken this month by Northrop Aircraft, Inc., a change that reflects the company's broadened scope of operation. At the same time, the name of the firm's Northrop Division at Hawthorne, Calif., was changed to Norair, emphasizing the division's identity as a developer and producer of high performance aircraft and missiles.

Other Northrop divisions are Nortronics at Hawthorne and Anaheim; Radioplane at Van Nuys, Calif., and El Paso, Tex., and Northrop International here.

New Division Created at Aeronutronic Systems

GLENDALE, CALIF. — Aeronutronic Systems, Inc., Ford Motor Co. subsidiary, has formed a new division to be known as the Range Systems Division, with headquarters here and in Newport Beach. Established because of increased emphasis on missile and satellite range installations, the new unit will be headed by *J. R. Ambrose* and *Dr. Eric Durand*.

Aeronutronics, founded by Ford in 1956, is presently constructing a multi-million dollar research facility in Newport Beach. The new division also is establishing an office in the Ventura-Santa Barbara area.

Beckman System Installed

FULLERTON, CALIF.—A $250,000 electronic data processing system has been installed at the NASA Langley Research Field Research Center, Va., announces Beckman Instruments, Inc. The system is designed to speed wind tunnel testing of supersonic aircraft and missile structures.

California Standard to Build Polymer Unit in Richmond

SAN FRANCISCO—Plans to build a polymer plant at its new fluid catalytic cracking plant facility in Richmond, near here, have been announced by Western Operations, Inc., subsidiary of Standard Oil of California.

Scheduled for completion late this year, the polymer plant is the third auxiliary unit being constructed to operate with the cracking plant, bringing total cost of the operation to some $30,000,000. The 55,000-bbl.-a-day cracker is slated to begin operations this summer.

RCA Plans Big Radar, Missile Center in Van Nuys

VAN NUYS, CALIF.—A giant missile and radar center will be built on a 50-acre site here by Radio Corporation of America. Comprising several engineering, production and administrative buildings, the center will be used to satisfy expanding requirements of the corporation's Los Angeles plant and the RCA Moorestown, N. J., facility.

Initial construction at the center calls for six buildings—three for engineering, one for administration, one for production, plus a cafeteria, providing 220,000 sq. ft. in all.

Some of the buildings will be occupied in late summer, and completion of the initial construction is scheduled for the end of the year.

Biggest Single Assembly For Gas Production at Linde

PITTSBURGH, CALIF.—The West recently saw the arrival of the biggest single assembly for production of liquid gas in the nation. The largest single rail shipment of industrial gas equipment ever sent across the nation by Linde Co., division of Union Carbide Corp., it came to the building site of that firm's new multi-million dollar plant near here.

Liquefiers, compressors and heat exchangers that can create as much as 190 tons of liquid oxygen and an equal amount of liquid nitrogen in a day were included in the shipment. Equipment will be installed by Kaiser Engineers Division of Oakland. First section of the new plant will go into operation next June, scheduled for a capacity of 115,000,000 cu. ft. monthly. This will increase to 220,000,000 cu. ft. when additional equipment goes on stream.

Factory Wages Rise

SAN FRANCISCO — The average gross earnings of factory workers in the San Francisco-Oakland metropolitan area increased to an all-time high of $103.82 in December, John F. Henning, California Director of Industrial Relations has announced.

First Output at West's Biggest Blast Furnace

FIRST MOLTEN PIG IRON flows from the West's biggest blast furnace, recently put into operation at Kaiser Steel's new Fontana, Calif., plant. The 232 ft.-tall furnace, fourth at the plant, is designed to produce some 1,750 tons of pig iron daily. This key facility increases Kaiser Steel's annual pig iron (hot metal) capacity from 1,314,000 tons to 1,912,000 tons. To provide increased tonnages of coke, which is the blast furnace's fuel, two new batteries of 45 coke ovens each will soon be put into operation. This will bring the total number of ovens to 315 and increase coke-producing capacity to 1,502,000 tons yearly.

Gates in Denver Schedules Increase in Production

DENVER — Gates Rubber Co. plans to operate its plant here three shifts a day, six days a week, in most departments through the first half of 1959 because of indicated sales volume, company spokesmen said. Sales were up 5% during 1958 to total about $115,000,000, according to *Charles C. Gates*, company president.

Systems Division of CEC Becomes Subsidiary

LOS ANGELES—Consolidated Electrodynamic's systems division is being incorporated into a wholly-owned subsidiary called Consolidated Systems Corp., the parent firm has announced. About 400 persons are employed in the division at Monrovia, Calif., in a recently built 57,500-sq. ft. building.

The division is engaged in development and production of instrumentation systems for industrial control, chemical analysis, high-speed electronic data processing and testing.

Mid-Continent Mfg. Co. Acquires New Building

HAWTHORNE, CALIF. — Mid-Continent Manufacturing Inc., recently acquired a new 13,500-sq. ft. brick building on a half-acre site here. Presently located on Aviation Blvd., Manhattan Beach, the firm is engaged in tool design, fabrication and production of aircraft spars and accessories.

GE to Enlarge Computer Facility in Arizona

PHOENIX—General Electric Co. has announced plans to expand the new Deer Valley Park plant of its computer department even before the new facility is fully occupied. Construction is expected to start soon on an 86,400-sq. ft. addition to the building now being completed and occupied at 13430 N. Black Canyon Highway.

Including equipment and building the addition will be a multi-million dollar installation and will be used as a manufacturing area, according to *Clair C. Lasher,* general manager. The new construction is part of a planned expansion, he said.

The one-story addition will join the present 104,000-sq. ft., two-story office wing at the Northwest corner and extend west. The addition, plus the 50,000 sq. ft. leased Peoria Ave. plant, will give the department 136,400 sq. ft. of manufacturing space and a Phoenix area total of 260,400 sq. ft.

All but one of the leased facilities now used will be retained. A section of Arizona State University's engineering center at Tempe is being vacated, but the department will maintain its Arizona State University computer center.

The department has about 1100 employees with approximately 825 of them in this area.

Hathaway Division, Denver, Opens New Laboratory

DENVER — Hathaway Instrument Division, Hamilton Watch Co., recently opened a new laboratory for research, development and production of aircraft and missile electronic devices here.

A complete environmental laboratory, the installation required an addition to the firm's existing $1,000,000 plant at 5800 E. Jewell Ave. The expansion was triggered by receipt of a $5,500,000 contract to provide electronics equipment for the Falcon air-to-air guided missile made by Hughes Aircraft.

O. L. King Co. Opens New Plant in Berkeley

BERKELEY—O. L. King & Co., San Francisco manufacturer of industrial and automotive lubricants and chemicals has opened a new plant and general office at 640 Gilman St., here.

The new facilities have 19,000 sq. ft. of floor space and a production capacity of 100,000 gallons daily. With 325,000 gal. of bulk storage now in use, the firm also plans additional facilities for 150,000 gal. of storage space in the near future.

Other equipment includes new stainless steel tanks and facilities to process petroleum, animal and vegetable oils. The firm recently began manufacture of core oils used in foundries and also enlarged its lanolin manufacturing department.

The property here will be used jointly by the King company and by its subsidiary, the Dacus Oil Co., which manufactures automotive lubricants.

Jeffrey Appoints Two More Western Distributors

COLUMBUS, OHIO—Jeffrey Manufacturing Co., has announced two Western distributors representatives in addition to those reported previously. (See January *WI*, page 89). The newly-announced firms are Power Transmission Equipment, Billings, Mont., and Power Transmission Equipment Co., in Southgate and Bakersfield, Calif.

Ling Electronics to Acquire Altec Companies, Inc.

CULVER CITY, CALIF.—Ling Electronics, Inc., has announced plans to acquire stock of Altec Companies, Inc., and its subsidiary, Altec Lansing Corp., and to operate both as subsidiaries.

Present plans call for changing the company name to Ling-Altec Electronics, Inc.

WEMCO Appoints Bacon Co.

SAN FRANCISCO—Wemco, a division of Western Machinery Co., has named six new distributors for its line of aggregate processing equipment. Among these is the Edward R. Bacon Co., which will cover Northern California and Western Nevada.

Kit Manufacturing Co. Dedicates Idaho Plant

CALDWELL, IDA.—A chance for the public to witness full scale production during an open house was a feature of the recent dedication ceremonies when Kit Manufacturing Co., Inc., started its new plant here. Production, with all employees on hand, continued from 12 noon until the close of the program at 9 p. m.

Kit Manufacturing Co., Inc., with headquarters at 1401 W. 17th St., Long Beach, Calif., manufactures automobile house and home trailers, mobile homes and other mobile units.

Among the 5,000 who attended the dedication and toured the plant were state, and local and civic officials. Kit officials included *Dan Pocapalia*, president.

Alvin Warren is sales manager at the new facility and *Ray Skinner*, production superintendent.

Sterling Tank & Steel Opens New Denver Plant

DENVER—Sterling Tank and Steel Co., formerly of Sterling, Colo., has erected a new plant at 6401 East 80th Ave. here and is now in production at that point, according to *Lloyd Crawford*, president and general manager.

The new plant is entirely modern and flexible with increased production facilities and an expanded line of production. A force of experienced steel fabricating men has been recruited and are in charge of shop production. The plant is equipped to handle plate steel up to 1¼" in thickness.

Particular emphasis will be on sheet and plate steel products which are fabricated to the customers specifications. In addition, code vessels, and both standard and special tanks for oil production and oil marketing will be built.

Kaiser Aluminum Cable Installed at Sunnyvale

SUNNYVALE, CALIF. — One of the West's largest installations of high voltage aluminum cable was completed recently at the U. S. Naval Industrial Reserve Ordnance plant adjacent to the missile systems division plant of Lockheed Aircraft Corp. here, where the Navy and Lockheed are developing the Polaris and other missiles.

Manufactured by Kaiser Aluminum & Chemical Corp., the cable will be used for feeder circuits in a 12 kv. underground neutral system. More than 26,500 ft. of aluminum power cable, Kalzone (butyl) insulated, aluminum shielded and neoprene sheathed was used to complete the circuits.

Work was performed by Pacific Electrical & Mechanical Co., Inc., San Francisco, and Rosendin Electric Co., San Jose.

Kaiser Dedication

(*Continued from page* 89)

the same raw materials as other steelmaking methods—molten pig iron, steel scrap and fluxing materials. The most revolutionary aspects of the basic oxygen process are its speed of production and the fact that high purity oxygen is used as the fuel instead of externally fired gas or oil. A jet of high purity oxygen is directed over the surface of the molten metal in the furnace resulting in an immediate reaction which builds the temperature of the metal up to 3000 degress F. and refines the charge into high quality steel.

Comstock Steel of Phoenix is Bernard Epps' Distributor

PHOENIX—Comstock Steel Co. has been appointed a distributor for the Bernard Epps Co., of Los Angeles, announces *Bernard Epps*, president.

Comstock will handle distribution for the electric welded steel tubing made by Epps' Tube Manufacturing Division, 2332 E. 38th St. The Arizona firm has warehouses here and in Tucson, as well as one recently opened in Sacramento, Calif.

Seen at Recent Society Sessions . . .

WESTERN DELEGATES at the National Board of Directors meeting of the Society of Packaging and Handling Engineers, pose with others present at the meeting which was held in Chicago recently. Pictured are, left to right: **John W. McReynolds,** chairman of SPHE Board; **Kay Crowley,** SPHE Administrative Secretary; **John Mount,** president, National SPHE; **Harold Kilmer,** Western Regional Director; **Olive Salembier,** chapter director central California SPHE; **W. C. G. Brouwers,** president, Golden Gate chapter; **Maria Knar,** secretary; and **G. A. Peters,** chapter director, Phoenix, Ariz.

NATIONAL SPHE OFFICERS photographed at the recent Board of Directors meetings held in Chicago. Left to right are: **A. M. Lowbury,** secretary; **John Mount,** president; **John McReynolds,** chairman of the board; **W. L. Utley,** vice president; and **L. Beale,** treasurer. Business conducted during the meeting included the appointment of new chairmen to all national committees; a report on the constitution and by-laws; a plea for more technical articles from chapters for National technical bulletins; approval of the Northern California chapter's change of name to Golden Gate Chapter, and an announcement that the next Board Meeting will be held Oct. 16, 1959 in Chicago.

A JOINT MEETING of the San Francisco-Oakland and Peninsula chapters of the American Institute of Industrial Engineers brought together a large gathering at Sabella's restaurant in San Francisco. Pictured are, left to right: **H. F. Downie,** director; **F. E. Taylor,** president (San Francisco-Oakland); and **William M. Burke,** Bank of America research economist who spoke on the subject, "Industrial Future for Industrial Engineers".

FLASH . . . MERGER PROPOSALS APPROVED

Merger proposals made by joint committees of SPHE and AMHS have been approved in principal by both boards of directors of each national committee. The announcement, which came after deliberation at meetings in Cleveland and Chicago, was made by John Mount, President of National Society of Packaging and Handling Engineers; and Frank LaTour, National President of the American Materials Handling Society. It was added that further legal details attached to the merger are under consideration and that announcements of progress will be made as conclusions are reached.

Westerners at Work

Los Angeles Steel Casting Co.

R. H. McAllister

. . . announces that **Robert H. McAllister** has been elected president and general manager of the firm. McAllister started with Los Angeles Steel Casting 18 years ago, beginning as a molder's helper and serving in all phases of foundry production. His intensive foundry experience includes eight years in sales and service as assistant secretary, vice president and board member.

Strategic Industries Association

. . . elects **Harvey Riggs** president of this trade group of independent defense producers, succeeding **T. C. Coleman,** of Coleman Engineering Co. Riggs is president of International Electronics Research Corp., Burbank, Calif., manufacturer of heat-dissipating tube shields and other electronic devices.

West Coast Lumbermen's Assn.

. . . chooses **Robert E. Mahaffay** general manager and assistant manager of the West Coast Lumber Inspection Bureau. A member of the association staff since 1946, Mahaffay has served as trade promotion director and advertising and promotion manager in recent years.

CLASSIFIED SECTION

Space is sold as advertisers' inches. All advertisements in this section are ½ inch short of contracted space to allow for borders and composition. Rates are $15.50 a column inch. Copy should be sent in by the 25th of preceding month if proofs are required; by the 28th if no proofs are required.

Thermoid Division, H. K. Porter Co.

. . . a new division created after Porter's purchase of the Thermoid Co., reveals names of key personnel in the West. **J. H. Joiner,** formerly with Porter's Quaker-Pioneer Division, continues as Western regional sales manager, headquartered in Pittsburg, Calif. **R. W. Chaffin** is San Francisco district manager, succeeding **O. J. Sands,** who will be a special representative for the firm, based in Sacramento. In Los Angeles, the district manager is **R. E. Cook,** previously with Quaker-Pioneer, and in Seattle, this position is filled by **R. J. Laybak,** who was formerly with Thermoid.

Chainveyor Corp.

J. T. Holley

. . . advances **J. T. Holley** to be factory manager of its Los Angeles plant. Holley began his career with the overhead conveyor equipment manufacturer in 1950 and for the last two years has been West coast installation supervisor.

Crown Zellerbach Corp.

. . . sets up a premium service department, selecting **Robert H. Ziegler,** a West Coast manufacturers' representative, as head of the unit. Said to be the first of its kind in the West, the new department was established to develop, warehouse and distribute premiums and premium packaging.

Titan Metal Manufacturing Co.

J. M. Golden

. . . promotes **James M. Golden,** Western Division manager, to be vice president of this big new division. In his new post, Golden will direct all Titan activities through the 11 Western states from his headquarters at the new $3,000,000 brass rod mill in Newark, Calif. Golden joined Titan at Bellefonte, Pa., in 1948 after seven years with Chance Vought Division of United Aircraft. In 1953 he was named division foreman—service, and handled these responsibilities until appointment as Western Division manager while plans for the new unit were being made in 1956.

Weyerhaeuser Timber Co.

. . . names **Royce O. Cornelius** managing forester, succeeding **Edwin F. Heacot,** now manager of the Timberland Department. Cornelius has been assistant managing forester in the firm's Tacoma headquarters since 1952 and previously was with Weyerhaeuser at Coos Bay, Ore., and Vail-McDonald, Wash.

Comstock Steel Co.

. . . reports that **Donnell W. Newman** of Phoenix has been elected vice president in charge of operations for the firm's three subsidiaries in Phoenix, Tucson and Sacramento. Newman joined U. S. Steel Corp. in 1948, with the supply division, later being transferred to sales work for that division in Salt Lake City. More recently he has been in Los Angeles and manager of sales in the Chicago district.

Autonetics, division of North American Aviation

. . . establishes a new department with **E. H. Schaefer** as its chief of operations, announces **James Emmi,** factory manager. The new unit is a manufacturing engineering department in which Schaefer will be responsible for developing of advanced production techniques and long-range manufacturing facilities planning. Schaefer was formerly chief engineer at Elgin National Watch Co.

Trans-Pak, Inc.

H. G. Wood

. . . announces that **Harry G. Wood** has joined the San Carlos firm as general manager. Trans-Pak, located at 948 American St., specializes in packaging and packing for domestic and export shipment and manufactures wooden boxes and crates, lightweight ply veneer crates, pallets, skids and shelving. Wood was previously production manager at M. Greenberg's Sons, San Francisco, and has also been associated with Schlage Lock Co.

W. P. Fuller & Co.

. . . announces appointment of **John M. Fuller,** great-grandson of the firm's founder, as general manager of its Central Region. Fuller joined the company 12 years ago in the general sales department, San Francisco, was appointed manager of the Honolulu branch in 1954 and has recently been operations manager of the Central Region. He succeeds the late **S. H. Kline.**

Touch-Plate Mfg. Co.

. . . names **John Mutschler** as factory superintendent of the Paramount, Calif., manufacturer of low voltage, multiple switching systems. The appointment, announced by **Art Linkletter,** president, coincides with the firm's recent plant facility expansion that will double its production space. Mutschler has previously been factory superintendent at Perm-O-Flux, manufacturer of electrical components.

Fibreboard Paper Products Co.

. . . reveals four managerial appointments made recently. **E. W. Carey** was named vice-president—marketing, assuming duties of **B. P. Altich,** currently on leave of absence. Carey had been vice-president — administration and some of his staff functions will now be assumed by **Joseph B. Fagot,** appointed general manager of the administration division. Fagot was formerly director of management development. Other appointments deal with **J. F. Havard** who will continue as vice-president, now in charge of engineering and resources, and **George Burgess,** formerly project director of the manufacturing division and now general manager of that division.

Westinghouse Electric Corp.

G. B. Rathbun

. . . appoints **Gail B. Rathbun** engineering manager for electrical products at its Sunnyvale division, succeeding **Joseph H. Cox** who retired in January. Rathbun has been project manager of motor operations since 1955, after joining the firm in 1939 and service in the East at Emeryville, Calif. Cox, who last year was made a Fellow in the American Institute of Electrical Engineers, has been associated with the firm since 1923.

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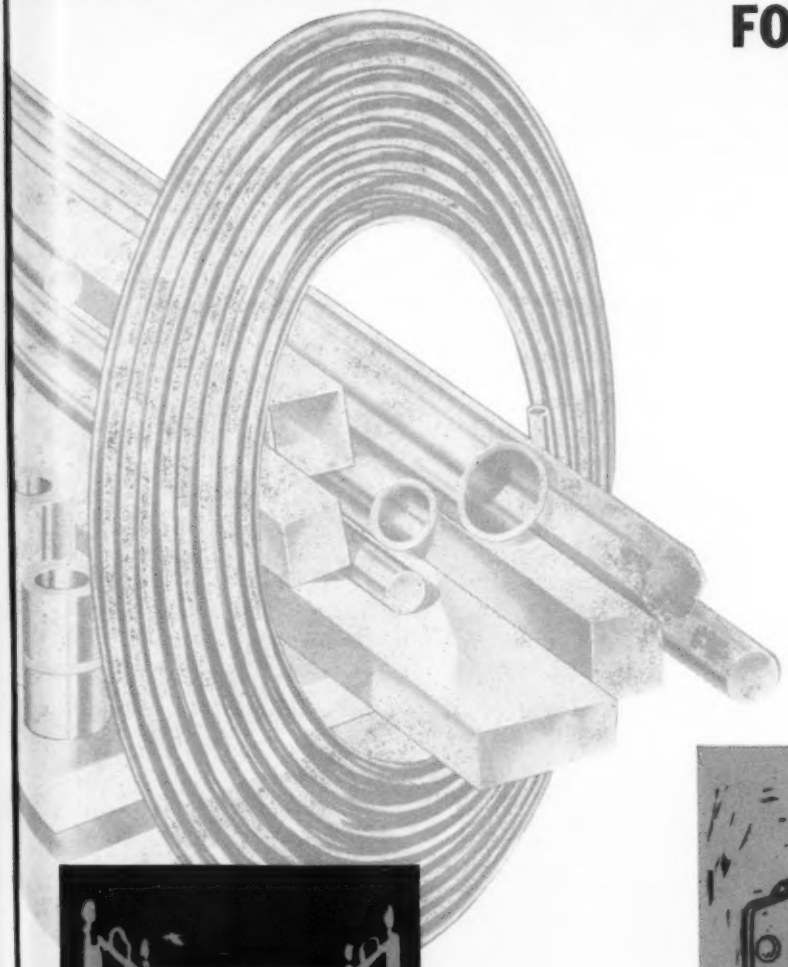

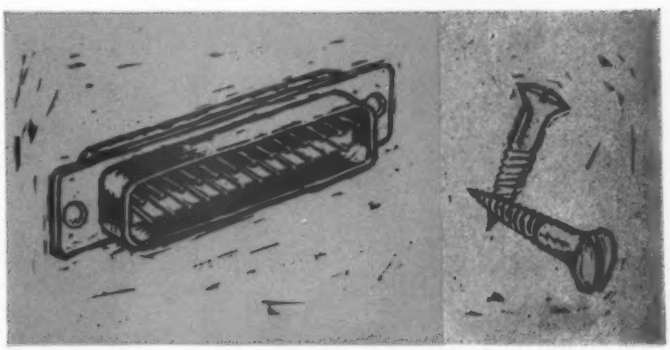

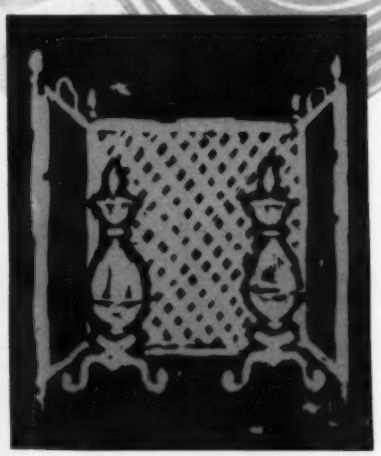

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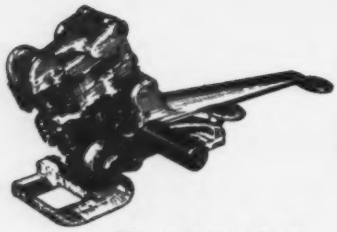

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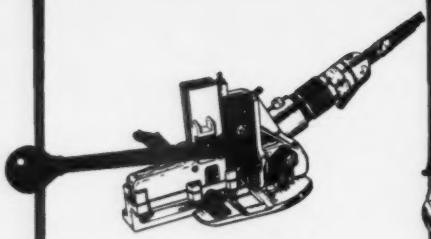

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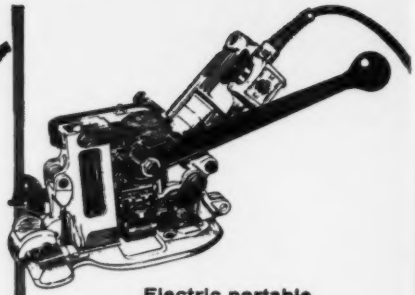

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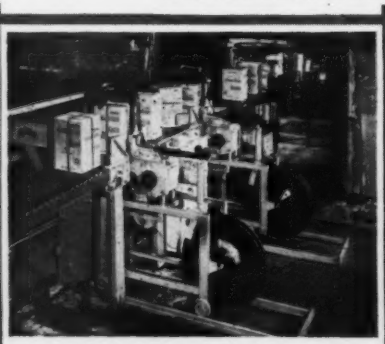

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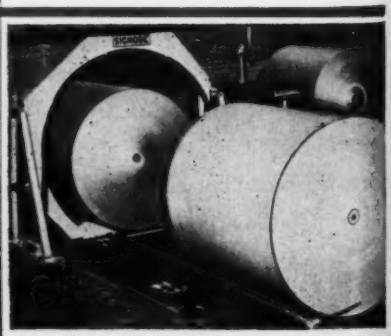

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